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# Census of Manufactures

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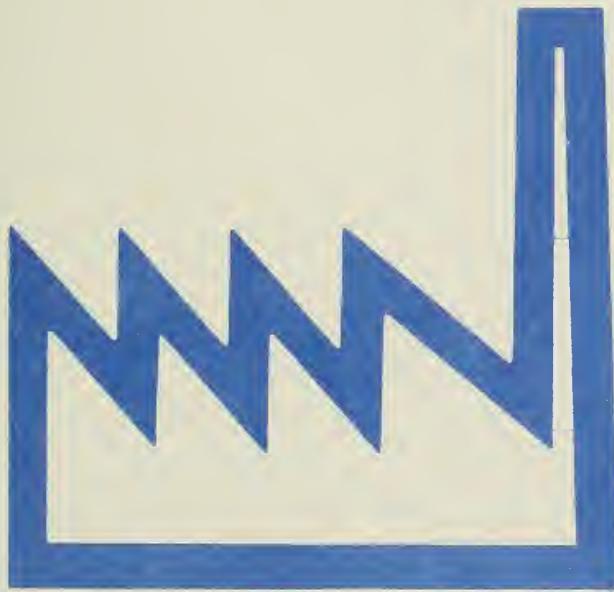
MC87-I-35C

## INDUSTRY SERIES

### Metalworking Machinery and Equipment

Industries 3541, 3542, 3543, 3544, 3545,  
3546, 3547, 3548, and 3549

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# ACKNOWLEDGMENTS

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Many persons participated in the various activities of the 1987 Census of Manufactures.

The overall planning and review of the census operations were performed by the staff of the Office of the Assistant Director for Economic and Agriculture Censuses.

This report was prepared in the Industry Division. **John Govoni**, Assistant Chief for Census/ASM Programs, was responsible for the overall planning, management, and coordination of the census of manufactures. Planning and implementation were under the direction of **Kenneth I. Hansen**, Chief, Census/ASM Durable Branch, assisted by **Charles T. Lee, Jr.**, Section Chief, with primary data analysis responsibilities performed by **Mary Jane Gwynn**.

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If you have any questions concerning the statistics in this report, call (301) 763-7304.

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# Census of

# Manufactures

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# INTRODUCTION

## PURPOSE AND USES OF THE ECONOMIC CENSUSES

The economic censuses are the major source of facts about the structure and functioning of the Nation's economy. They provide essential information for government, business, industry, and the general public.

*Economic censuses furnish an important part of the framework for such composite measures as the gross national product, input-output measures, production and price indexes, and other statistical series that measure short-term changes in economic conditions.*

*Policy-making agencies of the Federal Government use the data, especially in monitoring economic activity and providing assistance to business.*

*State and local governments use the data to assess business activities and tax bases within their jurisdictions and to develop programs to attract business.*

*Trade associations study trends in their own and competing industries, and keep their members informed of market changes.*

*Individual businesses use the data to locate potential markets and to analyze their own production and sales performance relative to industry or area averages.*

## AUTHORITY AND SCOPE

Title 13 of the United States Code (sections 131, 191, and 224) directs the Census Bureau to take the economic censuses every 5 years, covering years ending in 2 and 7. The 1987 Economic Censuses consist of the

- Census of Retail Trade
- Census of Wholesale Trade
- Census of Service Industries
- Census of Transportation
- Census of Manufactures
- Census of Mineral Industries
- Census of Construction Industries

Special programs also cover enterprise statistics and minority-owned and women-owned businesses. (The 1987 Census of Agriculture and 1987 Census of Governments are conducted separately.) The next economic censuses are scheduled to be taken in 1993 covering the year 1992.

## AVAILABILITY OF THE DATA

The results of each of the economic censuses are available in printed reports, for sale by the U.S. Government Printing Office, and on microfiche, computer tape, compact discs with read-only memory, and flexible diskettes, for sale by the Census Bureau. Order forms for all types of products are available on request from Customer Services, Census Bureau, Washington, DC 20233. A more complete description of publications being issued from this census is on the inside back cover of this document.

Census facts are also widely disseminated by trade associations, business journals, and newspapers. Volumes containing census statistics are available in most major public and college libraries. Finally, State Data Centers in every State and Business and Industry Data Centers in many States also supply economic census statistics.

## WHAT'S NEW IN 1987

Several changes have taken place for the 1987 censuses. Data will be reported on the basis of the newly revised Standard Industrial Classification (SIC) system with selected reports including "bridge tables," linking the old and new classification systems. A new set of metropolitan areas has been adopted, and more detailed information will be available for businesses with no paid employees. For additional information on these changes, review the subsequent text.

## HISTORICAL INFORMATION

The economic censuses have been taken together as an integrated program at 5-year intervals since 1967, and before that for 1963, 1958, and 1954. Prior to that time, the individual censuses were taken separately at varying intervals.

The economic censuses trace their beginnings to the 1810 Decennial Census, when questions on manufacturing were included with those for population. Coverage of economic activities was expanded for 1840 and subsequent censuses to include mining and some commercial

activities. In 1902, Congress established a permanent Census Bureau and directed that a census of manufactures be taken every 5 years. The 1905 manufactures census was the first time a census was taken apart from the regular every-10-year population census.

The first census of business was taken in 1930, covering 1929. Initially it covered retail and wholesale trade, and construction industries, but it was broadened in 1933 to include some of the service trades.

The 1954 economic censuses were the first to be fully integrated—providing comparable census data across economic sectors, using consistent time periods, concepts, definitions, classifications, and reporting units. These were the first censuses to be taken by mail, using lists of firms provided by the administrative records of other federal agencies. Since 1963, administrative records have also been used to provide basic statistics as well for very small firms, reducing or eliminating the need to send them census questionnaires. The Enterprise Statistics Program, which publishes combined data from the economic censuses, was made possible with the implementation of the integrated census program in 1954.

The range of industries covered in the economic censuses has continued to expand. The Census of Construction Industries began on a regular basis in 1967, and the scope of service industries was broadened in 1967, 1977, and 1987. The Census of Transportation began in 1963 as a set of surveys covering travel, transportation of commodities, and trucks. New for 1987 are publications reporting on business establishments engaged in several transportation industries, paralleling the data on establishments in other sectors. This is part of a gradual expansion in coverage of industries previously subjected to government regulation. The Survey of Minority-Owned Business Enterprises was first conducted as a special project in 1969 and was incorporated into the economic censuses in 1972 along with the Survey of Women-Owned Businesses.

Economic censuses have also been taken in Puerto Rico since 1909, in the Virgin Islands and Guam since 1958, and in the Northern Mariana Islands since 1982.

Statistical reports from the 1982 and earlier censuses provide historical figures for the study of long-term time series, and are available in some large libraries. All of the census data published since 1967 are still available for sale on microfiche from the Census Bureau.

## AVAILABILITY OF MORE FREQUENT ECONOMIC DATA

While the censuses provide complete enumerations every 5 years, there are many needs for more frequent data as well. The Census Bureau conducts a number of monthly, quarterly, and annual surveys, the results of which appear in publication series such as *Current Business Reports* (retail and wholesale trade and service industries), the *Annual Survey of Manufactures*, *Current Industrial Reports*, and the *Quarterly Financial Report*. Most of these surveys, while providing more frequent

observations, yield less kind-of-business and geographic detail than the censuses. The *County Business Patterns* program offers annual statistics on the number of establishments, employment, and payroll classified by industry within each county.

## SOURCES FOR MORE INFORMATION

More information about the scope, coverage, classification system, data items, and publications for each of the economic censuses and related surveys is published in the *Guide to the 1987 Economic Censuses and Related Statistics*. More information on the methodology, procedures, and history of the censuses will be published in the *History of the 1987 Economic Censuses*. Contact Customer Services for information on availability.

## CENSUS OF MANUFACTURES

### General

This report, from the 1987 Census of Manufactures, is one of a series of 83 industry reports, each of which provides statistics for individual industries or groups of related industries. Additional separate reports will be issued for each State and the District of Columbia and for special subjects such as type of organization, distribution of sales by class of customer, concentration ratios and water use in manufacturing.

The industry reports include such statistics as number of establishments, employment, payroll, value added by manufacture, cost of materials consumed, capital expenditures, product shipments, etc.

State reports present similar statistics for each State and its important metropolitan statistical areas (MSA's), counties, and places. Selected statistical totals for "all manufacturing" have been shown in the State reports for MSA's with 250 employees or more and for counties and places with 450 employees or more.

The *General Summary* report will contain industry, product class, and geographic area statistics summarized in one report. The introduction to the *General Summary* discusses, at greater length, many of the subjects described in this introduction. For example, the *General Summary* text will discuss the relationship of value added by manufacture to National income by industry of origin, the changes in statistical concepts over the history of the censuses, and the valuation problems arising from intracompany transfers between manufacturing plants of a company and between manufacturing plants and sales offices and sales branches of a company.

### Scope of Census and Definition of Manufacturing

The 1987 Census of Manufactures covers all establishments with one paid employee or more primarily engaged in manufacturing as defined in the *1987 Standard Industrial*

*Classification (SIC) Manual*<sup>1</sup>. This is the system of industrial classification developed by experts on classification in Government and private industry under the guidance of the Office of Information and Regulatory Affairs, Office of Management and Budget. This classification system is used by Government agencies as well as many organizations outside the Government.

The SIC Manual defines manufacturing as the mechanical or chemical transformation of substances or materials into new products. The assembly of component parts of products also is considered to be manufacturing if the resulting product is neither a structure nor other fixed improvement. These activities are usually carried on in plants, factories, or mills that characteristically use power-driven machines and materials-handling equipment.

Manufacturing production is usually carried on for the wholesale market, for transfers to other plants of the same company, or to the order of industrial users rather than for direct sale to the household consumer. Some manufacturers in a few industries sell chiefly at retail to household consumers through the mail, through house-to-house routes, or through salespersons. Some activities of a service nature (enameling, engraving, etc.) are included in manufacturing when they are performed primarily for trade. They are considered nonmanufacturing when they are performed primarily to the order of the household consumer.

## **Relationship Between Annual Survey of Manufactures and Census of Manufactures**

The Bureau of the Census conducts the annual survey of manufactures (ASM) in each of the 4 years between the censuses of manufactures. The ASM is a probability-based sample of approximately 56,000 establishments and collects the same industry statistics (employment, payroll, value of shipments, etc.) as the census of manufactures. In addition to collecting the information normally requested on the census form, the establishments in the ASM sample are requested to supply information on assets, capital expenditures, retirements, depreciation, rental payments, supplemental labor costs, costs of purchased services, and foreign content of materials consumed. Except for supplemental labor costs, the extra ASM items are collected only in census years.

## **Establishment Basis of Reporting**

The census of manufactures is conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each location. The ASM also is conducted on an establishment basis, but separate reports are filed for just those establishments selected in the sample. Companies engaged in

distinctly different lines of activity at one location are requested to submit separate reports if the plant records permit such a separation and if the activities are substantial in size.

In 1987, as in earlier years, a minimum size limit was set for inclusion of establishments in the census. All establishments employing one person or more at any time during the census year are included. The same size limitation has applied since 1947 in censuses and annual surveys of manufactures. In the 1939 and earlier censuses, establishments with less than \$5,000 value of products were excluded. The change in the minimum size limit in 1947 does not appreciably affect the historical comparability of the census figures except for data on number of establishments for a few industries. This report excludes information for separately operated administrative offices, warehouses, garages, and other auxiliary units that service manufacturing establishments of the same company (see *Auxiliaries*).

## **Manufacturing Universe and Census Report Forms**

The 1987 Census of Manufactures universe includes approximately 350,000 establishments. The amounts of information requested from manufacturing establishments were dependent upon a number of factors. The more important considerations were the size of the company and whether it was included in the annual survey of manufactures. The methods of obtaining information for the various subsets of the universe to arrive at the aggregate figures shown in the publication are described below:

### **1. Small Single-Establishment Companies Not Sent a Report Form**

In the 1987 Census of Manufactures, approximately 150,000 small single-establishment companies were excused from filing reports. Selection of these small establishments was done on an industry-by-industry basis and was based on annual payroll and total shipments data as well as on the industry classification codes contained in the administrative records of Federal agencies. The cutoffs were selected so that these administrative-records cases would account for no more than 3 percent of the value of shipments for all manufacturing. Generally, all single-establishment companies with less than five employees were excused, while all establishments with more than 20 employees were mailed forms.

Information on the physical location of the establishment, as well as information on payrolls, receipts (shipments), and industry classification, was obtained from the administrative records of other Federal agencies under special arrangements, which safeguarded their confidentiality. Estimates of data for these small establishments were developed using industry averages in conjunction with the administrative information. The value of shipments and cost of materials

<sup>1</sup>Standard Industrial Classification Manual: 1987: For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, Stock No. 041-001-00314-2.

were not distributed among specific products and materials for these establishments but were included in the product and material "not specified by kind" (n.s.k.) categories.

The industry classification codes included in the administrative-records files were assigned on the basis of brief descriptions of the general activity of the establishment. As a result, an indeterminate number of establishments were erroneously coded at the four-digit SIC level. This was especially true whenever there was a relatively fine line of demarcation between industries or between manufacturing and nonmanufacturing activity.

Sometimes these administrative-record cases were only given a two- or three-digit SIC group. For the 1987 Census of Manufactures, these establishments were sent a separate classification form, which requested information on the products and services of the establishment. This form was used to code many of these establishments to the four-digit SIC level. Establishments that did not return the classification form were coded later to those four-digit SIC industries identified as "not elsewhere classified" (n.e.c.) within the given two- or three-digit industry groups.

As a result of these situations, a number of small establishments may have been misclassified by industry. However, such possible misclassification has no significant effect on the statistics other than on the number of companies and establishments.

The total establishment count for individual industries should be viewed as an approximation rather than a precise measurement. The counts for establishments with 20 employees or more are far more reliable than the count of total number of establishments.

## 2. Establishments Sent a Report Form

The 200,000 establishments covered in the mail canvass were divided into three groups:

a. **ASM sample establishments**—This group consisted of approximately 56,000 establishments covering all the units of large manufacturing establishments as well as a sample of the medium and smaller establishments. The probability of selection was proportionate to size (see appendix, Annual Survey of Manufactures).

In a census of manufactures year, the ASM report form (MA-1000) replaces the first page of the regular census form for those establishments included in the ASM. In addition to information on employment, payroll, and other items normally requested on the regular census form, establishments in the ASM sample were requested to supply information on assets, capital expenditures, retirements, depreciation, rental payments, supplemental labor costs, and costs of purchased services. See appendix A, section 2, for an explanation of these items.

The census part of the report form is one of approximately 200 versions containing product, material, and special inquiries. The diversity of manufacturing activities necessitated the use of these many forms to canvass the 459 manufacturing industries. Each form was developed for a group of related industries.

Appearing on each form was a list of products primary to the group of related industries as well as secondary products and miscellaneous services that establishments classified in these industries were likely to be performing. Respondents were requested to identify the products, the value of each product, and, in a large number of cases, the quantity of the product shipped during the survey year. Space also was provided for the respondent to describe products not specifically identified on the form.

The report form also contained a materials-consumed inquiry, which varied from form to form depending on the industries being canvassed. The respondents were asked to review a list of materials generally used in their production processes. From this list, each establishment was requested to identify those materials consumed during the survey year, the cost of each, and, in certain cases, the quantity consumed. Once again, space was provided for the respondent to describe significant material not identified on the form.

Finally, a wide variety of special inquiries was included to measure activities peculiar to a given industry, such as operations performed and equipment used.

- b. **Large and medium establishments (non-ASM)**—Approximately 84,000 establishments were included in this group. A variable cutoff, based on administrative-records payroll data and determined on an industry-by-industry basis, was used to select those establishments that were to receive one of the approximately 200 census of manufactures regular forms. The first page, requesting establishment data for items such as employment and payroll, was standard but did not contain the detailed statistics included on the ASM form. The product, material, and special inquiry sections supplied were based on the historical industry classification of the establishment.
- c. **Small single-establishment companies (non-ASM)**—This group consisted of approximately 60,000 establishments. For those industries where application of the variable cutoff for administrative-records cases resulted in a large number of small establishments being included in the mail canvass, an abbreviated or "short" form was used. These establishments received one of the approximately 80 versions of the short form, which requested

summary product and material data and totals but no details on employment, payrolls, cost of materials, inventories, and capital expenditures.

Use of the short form has no adverse effect on published totals for the industry statistics; the same data were collected on the short form as on the long form. However, detailed information on materials consumed was not collected on the short form; thus its use would increase the value of the n.s.k. categories.

## Auxiliaries

In this industry report, the data on employment and payroll are limited to operating manufacturing establishments. The census report form filed for auxiliaries (ES-9200) requested a description of the activity of the establishments serviced. However, the manufacturing auxiliaries were coded only to the two-digit major group of the establishments they served; whereas, the operating establishments were coded to a four-digit manufacturing industry. Data for the approximately 10,000 separately operated auxiliaries are included in the geographic area series and in a report issued as part of the 1987 Enterprise Statistics Survey.

Auxiliaries are establishments whose employees are primarily engaged in performing supporting services for other establishments of the same company, rather than for the general public or for other business firms. They can be at different locations from the establishments served or at the same location as one of those establishments but not operating as an integral part thereof and serving two establishments or more. Where auxiliary operations are conducted at the same location as the manufacturing operation and operate as an integral part thereof, they usually are included in the report for the operating manufacturing establishment.

Included in the broad category of auxiliaries are administrative offices. Employees in administrative offices are concerned with the general management of multiestablishment companies, i.e., with the general supervision and control of two units or more, such as manufacturing plants, mines, sales branches, or stores. The functions of these employees may include (1) program planning, including sales research and coordination of purchasing, production, and distribution; (2) company purchasing, including general contracts and purchasing methods; (3) company financial policy and accounting; (4) general engineering, including design of product machinery and equipment, and direction of engineering effort conducted at the individual operation locations; (5) direction of company personnel matters; and (6) legal and patent matters.

Other types of auxiliaries serving the plants or central management of the company include purchasing offices, sales promotion offices, research and development organizations, etc.

## Industry Classification of Establishments

Each of the establishments covered in the census was classified in 1 of 459 manufacturing industries in accordance with the industry definitions in the 1987 SIC Manual. The 1987 edition of this manual represents a major revision for manufacturing industries from the 1972 edition and its 1977 supplement. Appendix A of the 1987 Manual notes the revisions in the four-digit industry levels between 1972/77 and 1987.

An industry is generally defined as a group of establishments producing the same product or a closely related group of products. The product groupings from which industry classifications are derived are based on considerations such as similarity of manufacturing processes, types of materials used, types of customers, and the like. The resulting group of establishments must be significant in terms of number, value added by manufacture, value of shipments, and number of employees. The system operates in such a way that the definitions progressively become narrower with successive additions of numerical digits. For 1987, there are 20 major groups (two-digit SIC), 139 industry groups (three-digit SIC), and 459 industries (four-digit SIC). This represents an expansion of four-digit industries from 452 in 1972/77 and a reduction of three-digit groups from 143 in 1972/77. Product classes and products of the manufacturing industries have been assigned codes based on the industry from which they originate. There are about 11,000 products identified by a seven-digit code. The seven-digit products are considered the primary products of the industry with the same four digits.

Accordingly, an establishment is usually classified in a particular industry on the basis of its major activity during a particular year, i.e., production of the products primary to that industry exceeds, in value, production of the products primary to any other single industry. In a few instances, however, the industry classification of an establishment is not only determined by the products it makes but also by the process employed in operations. Refining of nonferrous metals from ore or rolling and drawing of nonferrous metals (processes which involve heavy capitalization in specialized equipment) would be classified according to the process used during a census year. These establishments then would be "frozen" in that industry during the following ASM years.

In either a census or ASM year, establishments included in the ASM sample with certainty weight, other than those involved with heavily capitalized activities described above, are reclassified by industry only if the change in the primary activity from the prior year is significant or the change has occurred for 2 successive years. This procedure prevents reclassification when there are minor shifts in product mix.

In ASM years, establishments included in the ASM sample with noncertainty weight are not shifted from one industry classification to another. They are retained in the industry where they were classified in the base census year (see appendix, Annual Survey of Manufactures).

However, in the following census year, these ASM plants are allowed to shift from one industry to another.

The result of these rules covering the switching of plants from one industry classification to another is that, at the aggregate level, some industries comprise different mixes of establishments between survey years, and establishment data for such industry statistics as employment and payroll may be tabulated in different industries between survey years. Hence, comparisons between prior-year and current-year published totals, particularly at the four-digit SIC level, should be viewed with caution. This is particularly true for the comparison between the data shown for a census year versus the data shown for the previous ASM year.

As previously noted, the small establishments that may have been misclassified by industry are usually administrative-record cases whose industry codes were assigned on the basis of incomplete descriptions of the general activity of the establishment. Such possible misclassifications have no significant effect on the statistics other than on the number of companies and establishments.

While some establishments produce only the primary products of the industry in which they are classified, all establishments of an industry rarely specialize to this extent. The industry statistics (employment, inventories, value added by manufacture, total value of shipments including resales and miscellaneous receipts, etc.) shown in tables 1a through 5a, therefore, reflect not only the primary activities of the establishments in that industry but also their secondary activities. The product statistics in table 6a represent the output of all establishments whether or not they are classified in the same industry as the product. For this reason, in relating the industry statistics, especially the value of shipments to the product statistics, the composition of the industry's output shown in table 5b should be considered.

The extent to which industry and product statistics may be matched with each other is measured by two ratios which are computed from the figures shown in table 5b. The first of these ratios, called the primary product specialization ratio, measures the proportion of product shipments (both primary and secondary) of the establishments classified in the industry represented by the primary products of those establishments. The second ratio, called the coverage ratio, is the proportion of primary products shipped by the establishments classified in the industry to total shipments of such products by all manufacturing establishments.

However, establishments making products falling into the same industry category may use a variety of processes and materials to produce them. Also, the same industry classification (based on end products) may include both establishments that are highly integrated and those that put only the finishing touches on an already highly fabricated item. For example, the refrigeration equipment industry includes instances of almost complete integration (production of the compressor, condensing unit, electric motor, casting, stamping of the case, and final assembly) all

carried on at one plant. On the other hand, the condensing unit, the motor, and the case may be purchased and only assembled into the finished product.

In some instances, separate industry categories have been established for integrated and nonintegrated establishments. For other industries, the census provides separate statistics on the production of intermediate commodities made and used in the producing plant. For some industries characterized by many plants of the same company, separate figures on interplant transfers of products usually are shown.

Differences in the integration of production processes, types of operations, and alternatives in types of materials used should be considered when relating the industry statistics (employment, payrolls, value added, etc.) to the product and material data.

## **Value of Shipments for the Industry Compared With Value of Product Shipments**

This report shows value of shipments data for industries and products. In tables 1a through 5a, these data represent the total value of shipments of all establishments classified in a particular industry. The data include the shipments of the products classified in the industry (primary to the industry), products classified in other industries (secondary to the industry), and miscellaneous receipts (repair work, sale of scrap, research and development, installation receipts, and resales). Value of product shipments shown in table 6a represents the total value of all products shipped that are classified as primary to an industry.

## **CENSUS DISCLOSURE RULES**

In accordance with Federal law governing census reports, no data are published that would disclose the data for an individual establishment or company. However, the number of establishments classified in a specific industry is not considered a disclosure, so this information may be released even though other information is withheld.

The disclosure analysis for the industry statistics in tables 1a through 5a of this report is based on the total value of shipments. When the total value of shipments cannot be shown without disclosing information for individual companies, the complete line is suppressed. However, the suppressed data are included in higher-level totals. Additional disclosure analysis is performed for new capital expenditures that can be suppressed even though value of shipments data are publishable.

## **SPECIAL TABULATIONS**

Special tabulations of data collected in the 1987 Census of Manufactures may be obtained on computer tape or in tabular form. The data will be in summary form and subject to the same rules prohibiting disclosure of confidential

information (including name, address, kind of business, or other data for individual business establishments or companies) as are the regular publications.

Special tabulations are prepared on a cost basis. A request for a cost estimate, as well as exact specifications on the type and format of the data to be provided, should be directed to the Chief, Industry Division, Bureau of the Census, Washington, DC 20233.

## ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used in this publication:

- Represents zero.
- (D) Withheld to avoid disclosing data for individual companies; data are included in higher level totals.
- (NA) Not available.
- (NC) Not comparable.
- (S) Withheld because estimate did not meet publication standards.
- (X) Not applicable.
- (Z) Less than half the unit shown.
- do Ditto.

n.e.c.	Not elsewhere classified.
n.s.k.	Not specified by kind.
pt.	Part.
r	Revised.
SIC	Standard Industrial Classification.

Other abbreviations, such as lb, gal, yd, doz, bbl, and tons, are used in the customary sense.

## CONTACTS FOR DATA USERS

Subject Area	Contact	Phone
Census/ASM		
Durables	Kenneth Hansen	(301) 763-7304
Nondurables	Michael Zampogna	(301) 763-2510
Current Industrial Reports		
Durables	Malcolm Bernhardt	(301) 763-2518
Nondurables	Thomas Flood	(301) 763-5911
Import/Export Publications	Foreign Trade Division	(301) 763-5140
Industry Analysis and Forecasts	International Trade Administration	(202) 377-4356

# Users' Guide for Locating Statistics in This Report by Table Number

For explanation of terms, see appendixes

Item	Four-digit industry statistics							Five-digit product class and seven-digit product statistics			
	Historical	Operat-ing ratios	By geo-graphic area	Sum-mary and supple-mental	By employ-ment size	By industry and product class special-ization	Materials con-sumed by kind	Industry-product analysis	Product ship-ments	Product class by geo-graphic area	Historical product class
Number of companies .....	1a			3a						*6a	
Number of establishments....	1a			2	3a	4	5a				
Employment and payroll:.....											
Number of employees .....	1a	1b	2	3a	4	5a					
Payroll .....	1a	1b	2	3a	4	5a					
Supplemental labor costs ..				3a							
Production workers.....	1a	1b	2	3a	4	5a					
Production- worker hours....	1a	1b	2	3a	4	5a					
Production- worker wages....	1a	1b	2	3a	4	5a					
Shipments, cost of materials, and value added:											
Value of shipments (four-digit) .....	1a	1b	2	3a	4	5a			5b		
Product class shipments (five-digits) .....										6a	6b
Product shipments (seven-digit) .....										6a	6c
Value added by manufacture .....	1a	1b	2	3a	4	5a					
Cost of materials.....	1a	1b	2	3a	4	5a					
Fuels and electric energy ...				3a							
Materials consumed by kind ..				3a							
Inventories:											
Total, end of year .....	1a			3a							
By stage of fabrication .....				3a							
Capital expenditures, assets, rental payments, and purchased services:											
New capital expenditures....	1a			2	3b	4	5a				
Used plant and equipment expenditures.....					3b						
Gross assets .....					3b						
Depreciation.....					3b						
Retirements of buildings and machinery.....					3b						
Rental payments .....					3b						
Foreign content of materials consumed.....					3c						
Purchased services.....					3c						
Ratios:											
Specialization.....	1a				3a					5b	
Coverage.....	1a				3a					5b	

\*Number of companies with shipments of more than \$100 thousand.

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## Metalworking Machinery and Equipment

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# DESCRIPTION OF INDUSTRIES AND SUMMARY OF FINDINGS

This report shows 1987 Census of Manufactures statistics for establishments classified in each of the following industries:

## SIC code and title

3541	Machine Tools, Metal Cutting Types
3542	Machine Tools, Metal Forming Types
3543	Industrial Patterns
3544	Special Dies, Tools, Jigs, and Fixtures
3545	Machine Tool Accessories
3546	Power-Driven Handtools
3547	Rolling Mill Machinery
3548	Welding Apparatus
3549	Metalworking Machinery, N.E.C.

The industry statistics (employment, payroll, cost of materials, value of shipments, inventories, etc.) are reported for each establishment as a whole. Aggregates of such data for an industry reflect not only the primary activities of the establishments but also their activities in the manufacture of secondary products as well as their miscellaneous activities (contract work on materials owned by others, repair work, etc.). This fact should be taken into account when comparing industry statistics (tables 1 through 5a) with product statistics (table 6) showing shipments by all industries of the primary products of the specified industry. The extent of the "product mix" is indicated in table 5b, which shows the value of primary and secondary products shipped by establishments classified in the specified industry and the value of primary products of the industry shipped as secondary products by establishments classified in other industries.

Small single-establishment companies with up to 20 employees (cutoff varied by industry) were excluded from the mail portion of the census. For these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated), data on payrolls and receipts were obtained from administrative records of other Federal agencies. The remaining statistics were developed from industry averages.

Establishment data were tabulated based on industry definitions included in the 1987 Standard Industrial Classification (SIC) Manual<sup>1</sup>. The 1987 edition represents a major revision for manufacturing industries from the 1972

edition and its 1977 supplement. In addition to the 1987 SIC revision, changes were made to the product class (five-digit) and product code (seven-digit) categories. The product class and product code comparability between the 1987 and 1982 censuses is shown in the appendixes. These appendixes present, in tabular form, the linkage from 1987 to 1982.

All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

## INDUSTRY 3541, MACHINE TOOLS, METAL CUTTING TYPES

This industry is made up of establishments primarily engaged in manufacturing metal cutting type machine tools, not supported in the hands of an operator when in use, that shape metal by cutting or use of electrical techniques; the rebuilding of such machine tools, and the manufacture of replacement parts for them. Also included in this industry are metalworking machine tools designed primarily for home workshops. Establishments primarily engaged in the manufacture of electric and gas welding and soldering equipment are classified in industry 3548, and those manufacturing portable power-driven handtools are classified in industry 3546. Products of this industry also are collected in the Current Industrial Report MQ-35W, Metalworking Machinery.

The 1987 definition of this industry is the same as that used in the 1972/7 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1987 Census of Manufactures, Industry 3541, Machine Tools, Metal Cutting Types, had employment of 31.7 thousand. The employment figure was 46 percent below the 58.3 thousand reported in 1982. Compared with 1986, employment decreased 18 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses. The leading States in employment in 1987 were Ohio, Michigan, Illinois, and New York, accounting for 54 percent of the industry's employment. This represents a shift from 1982 when Ohio, Michigan, Illinois, and Connecticut accounted for 55 percent of the industry's employment.

The total value of shipments for establishments classified in this industry was \$3.2 billion.

<sup>1</sup>Standard Industrial Classification Manual: 1987. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Stock No. 041-001-00314-2.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3541 shipped \$2.4 billion of metal cutting machine tools products considered primary to the industry, \$484.8 million of secondary products, and had \$310.6 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 83 percent (specialization ratio). In 1982, the specialization ratio was 91 percent.

Establishments in this industry also accounted for 93 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1982, the coverage ratio also was 93 percent. The products primary to industry 3541, no matter in what industry they were produced, appear in table 6a and aggregate to \$2.6 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and electric energy used by establishments classified in the machine tools, metal cutting types, industry amounted to \$1.4 billion. Data on specific materials consumed appear in table 7.

The data for a small number of establishments whose reports were not received at the time the data were tabulated were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 5 percent of total value of shipments. For 1987, there were no small nonmail establishments for which administrative records were used.

## INDUSTRY 3542, MACHINE TOOLS, METAL FORMING TYPES

This industry is made up of establishments primarily engaged in manufacturing metal forming machine tools, not supported in the hands of an operator while in use, for pressing, hammering, extruding, shearing, die-casting, or otherwise forming metal into shape. This industry also includes the rebuilding of such machine tools and the manufacture of repair parts for them. Establishments primarily engaged in the manufacture of electric and gas welding equipment and soldering equipment are classified in industry 3548; those manufacturing portable power-driven handtools are classified in industry 3546; and those manufacturing rolling mill machinery and equipment are classified in industry 3547. Products of this industry also are collected in the Current Industrial Report MQ-35W, Metalworking Machinery.

The 1987 definition of this industry is the same as that used in the 1972/7 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1987 Census of Manufactures, Industry 3542, Machine Tools, Metal Forming Types, had employment of 13.8 thousand. The employment figure was 29 percent

below the 19.5 thousand reported in 1982. Compared with 1986, employment decreased 17 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses. The leading States in employment in 1987 were Illinois, Ohio, Michigan, and New York, accounting for 68 percent of the industry's employment. These same States were the leaders in 1982, when they accounted for 62 percent of the industry's employment.

The total value of shipments for establishments classified in this industry was \$1.4 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3542 shipped \$1.2 billion of metal forming machine tools products considered primary to the industry, \$116.7 million of secondary products, and had \$93.5 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 91 percent (specialization ratio). In 1982, the specialization ratio was 89 percent.

Establishments in this industry also accounted for 87 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1982, the coverage ratio also was 87 percent. The products primary to industry 3542, no matter in what industry they were produced, appear in table 6a and aggregate to \$1.4 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and electric energy used by establishments classified in the machine tools, metal forming types, industry amounted to \$637.8 million. Data on specific materials consumed appear in table 7.

The data for a small number of establishments whose reports were not received at the time the data were tabulated were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 10 percent of total value of shipments. For 1987, there were no small nonmail establishments for which administrative records were used.

## INDUSTRY 3543, INDUSTRIAL PATTERNS

This industry is made up of establishments primarily engaged in manufacturing industrial patterns.

The 1987 definition of this industry is the same as that used in the 1972/7 Standard Industrial Classification (SIC) system. However, the industry SIC number has been changed from 3565 to 3543.

In the 1987 Census of Manufactures, Industry 3543, Industrial Patterns, had employment of 8.6 thousand. The employment figure was 12 percent below the 9.8 thousand reported in 1982. Compared with 1986, employment increased

25 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses. The leading States in employment in 1987 were Michigan, Ohio, Wisconsin, and Tennessee. This represents a shift from 1982 when Michigan, Ohio, Pennsylvania, and Illinois were the leading States.

The total value of shipments for establishments classified in this industry was \$499.4 million.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3543 shipped \$445.0 million of industrial patterns products considered primary to the industry, \$36.5 million of secondary products, and had \$17.9 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 92 percent (specialization ratio). In 1982, the specialization ratio was 97 percent.

Establishments in this industry also accounted for 80 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1982, the coverage ratio was 76 percent. The products primary to industry 3543, no matter in what industry they were produced, appear in table 6a and aggregate to \$557.9 million. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and electric energy used by establishments classified in the industrial patterns industry amounted to \$112.5 million. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with up to 5 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 19 percent of total value of shipments.

## INDUSTRY 3544, SPECIAL DIES, TOOLS, JIGS, AND FIXTURES

This industry includes establishments commonly known as contract tool and die shops and primarily engaged in manufacturing, on a job or order basis, special tools and fixtures for use with machine tools, hammers, die-casting machines, and presses. The products of establishments classified in this industry include a wide variety of special toolings, such as dies; punches; diesets and components and sub-presses; jigs and fixtures; and special checking devices. Establishments primarily engaged in manufacturing molds for die-casting and foundry casting; metal molds for plaster working, rubber working, plastics working, glass

working and similar machinery are also included. Establishments primarily engaged in manufacturing molds for heavy steel ingots are classified in industry 3321, and those manufacturing cutting dies, except metal cutting, are classified in industry 3423.

The 1987 definition of this industry is the same as that used in the 1972/7 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1987 Census of Manufactures, Industry 3544, Special Dies, Tools, Jigs, and Fixtures, had employment of 114.4 thousand. The employment figure was 11 percent above the 102.9 thousand reported in 1982. Compared with 1986, employment increased 5 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses. The leading States in employment in 1987 were Michigan, Ohio, Illinois, and Pennsylvania, accounting for 54 percent of the industry's employment. These same States were the leaders in 1982 when they accounted for 53 percent of the industry's employment.

The total value of shipments for establishments classified in this industry was \$7.6 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3544 shipped \$6.7 billion of special dies, tools, jigs, and fixtures products considered primary to the industry, \$418.8 million of secondary products, and had \$453.2 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 94 percent (specialization ratio). In 1982, the specialization ratio also was 94 percent.

Establishments in this industry also accounted for 82 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1982, the coverage ratio was 79 percent. The products primary to industry 3544, no matter in what industry they were produced, appear in table 6a and aggregate to \$8.1 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and electric energy used by establishments classified in the special dies, tools, jigs, and fixtures industry amounted to \$2.2 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with up to 5 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 15 percent of total value of shipments.

## INDUSTRY 3545, MACHINE TOOL ACCESSORIES

This industry is made up of establishments primarily engaged in manufacturing cutting tools, machinists' precision measuring tools, and attachments and accessories for machine tools and for other metalworking machinery, not elsewhere classified. Establishments primarily engaged in manufacturing handtools, except power-driven types, are classified in industry group 342.

The 1987 definition of this industry is the same as that used in the 1972/7 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1987 Census of Manufactures, Industry 3545, Machine Tool Accessories, had employment of 48.4 thousand. The employment figure was 12 percent below the 55.1 thousand reported in 1982. The leading States in employment in 1987 were Michigan, Ohio, Illinois, and Massachusetts, accounting for 49 percent of the industry's employment. These same States were the leaders in 1982, when they accounted for 54 percent of the industry's employment.

The total value of shipments for establishments classified in this industry was \$3.6 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3545 shipped \$3.2 billion of machine tool accessories products considered primary to the industry, \$211.2 million of secondary products, and had \$220.8 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 94 percent (specialization ratio). In 1982, the specialization ratio was 92 percent.

Establishments in this industry also accounted for 93 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1982, the coverage ratio was 89 percent. The products primary to industry 3545, no matter in what industry they were produced, appear in table 6a and aggregate to \$3.4 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and electric energy used by establishments classified in the machine tool accessories industry amounted to \$1.0 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with up to 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 15 percent of total value of shipments.

## INDUSTRY 3546, POWER-DRIVEN HANDTOOLS

This industry is made up of establishments primarily engaged in manufacturing power-driven handtools, such as drills and drilling tools, pneumatic and snagging grinders, and electric hammers. Establishments primarily engaged in manufacturing metal cutting type and metal forming type machines (including home workshop tools) which are not supported in the hands of an operator are classified in industries 3541 and 3542; and those primarily manufacturing power-driven heavy construction or mining handtools are classified in industry group 353.

The 1987 definition of this industry is the same as that used in the 1972/7 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1987 Census of Manufactures, Industry 3546, Power-Driven Handtools, had employment of 16.8 thousand. The employment figure was 22 percent below the 21.6 thousand reported in 1982. Compared with 1986, employment decreased 6 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses. The leading States in employment in 1987 were North Carolina, Arkansas, Tennessee, and Arizona. This represents a shift from 1982 when North Carolina, South Carolina, Ohio, and Maryland were the leading States.

The total value of shipments for establishments classified in this industry was \$2.2 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3546 shipped \$1.6 billion of power-driven handtools products considered primary to the industry, \$335.6 million of secondary products, and had \$216.6 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 83 percent (specialization ratio). In 1982, the specialization ratio was 88 percent.

Establishments in this industry also accounted for 85 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1982, the coverage ratio was 91 percent. The products primary to industry 3546, no matter in what industry they were produced, appear in table 6a and aggregate to \$1.9 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and electric energy used by establishments classified in the power-driven handtools industry amounted to \$1.0 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with up to 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were

obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 5 percent of total value of shipments.

## INDUSTRY 3547, ROLLING MILL MACHINERY

This industry is made up of establishments primarily engaged in manufacturing rolling mill machinery and processing equipment for metal production, such as cold forming mills, structural mills, and finishing equipment.

The 1987 definition of this industry is the same as that used in the 1972/7 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1987 Census of Manufactures, Industry 3547, Rolling Mill Machinery, had employment of 3.9 thousand. The employment figure was 24 percent below the 5.1 thousand reported in 1982. Compared with 1986, employment increased 11 percent. The 1986 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses. The leading States in employment in 1987 were Ohio, Pennsylvania, Massachusetts, and Indiana. This represents a shift from 1982 when Pennsylvania, Ohio, Massachusetts, and California were the leading States.

The total value of shipments for establishments classified in this industry was \$467.8 million.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3547 shipped \$378.0 million of rolling mill machinery products considered primary to the industry, \$32.3 million of secondary products, and had \$57.5 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 92 percent (specialization ratio). In 1982, the specialization ratio was 79 percent.

Establishments in this industry also accounted for 94 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1982, the coverage ratio was 79 percent. The products primary to industry 3547, no matter in what industry they were produced, appear in table 6a and aggregate to \$403.0 million. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and electric energy used by establishments classified in the rolling mill machinery industry amounted to \$249.7 million. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with up to 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were

obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 5 percent of total value of shipments.

## INDUSTRY 3548, WELDING APPARATUS

This industry is made up of establishments primarily engaged in manufacturing electric and gas welding and soldering equipment and accessories. Also included are establishments primarily engaged in coating welding wire from purchased wire or from wire drawn in the same establishment. Establishments primarily engaged in manufacturing handheld soldering irons are classified in industry 3423, and those manufacturing electron beam, ultrasonic, and laser welding equipment are classified in industry 3699.

Industry 3548, Welding Apparatus, is a combination of 1972 SIC-based industry 3623 and 1972 SIC-based product classes 35495 pt., 35496, and 35497 pt. The effect of the revisions on the data is summarized in tables 1c-1 and 1c-2. During the 1987 processing, each establishment was classified according to both the old and new SIC. Table 1c-1 shows the distribution of the old SIC-based industries among the new SIC classifications.

In the 1987 Census of Manufactures, Industry 3548, Welding Apparatus, had employment of 18.7 thousand. The leading States in employment in 1987 were Ohio, Michigan, Wisconsin, and Pennsylvania.

The total value of shipments for establishments classified in this industry was \$2.1 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3548 shipped \$1.8 billion of welding apparatus products considered primary to the industry, \$200.1 million of secondary products, and had \$132.2 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 90 percent (specialization ratio).

Establishments in this industry also accounted for 92 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). The products primary to industry 3548, no matter in what industry they were produced, appear in table 6a and aggregate to \$1.9 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and electric energy used by establishments classified in the welding apparatus industry amounted to \$1.1 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with up to 20 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were

not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 9 percent of total value of shipments.

## **INDUSTRY 3549, METALWORKING MACHINERY, N.E.C.**

This industry is made up of establishments primarily engaged in manufacturing metalworking machinery, not elsewhere classified. Establishments primarily engaged in manufacturing automotive maintenance equipment are classified in industry 3559.

The 1987 definition of this industry has been revised from that used in the 1972 Standard Industrial Classification (SIC) manual. However, the SIC number and title are unchanged. 1972 SIC-based industry 3549 was split into two separate new industries: Welding Apparatus (SIC 3548) and Metalworking Machinery, N.E.C. (SIC 3549). The effect of the revisions on the data is summarized in tables 1c-1 and 1c-2. During the 1987 processing, each establishment was classified according to both the old and new SIC. Table 1c-1 shows the distribution of the new industry among the old SIC classifications. Table 1c-2 shows the distribution of the old SIC-based industries among the new SIC classifications.

In the 1987 Census of Manufactures, Industry 3549, Metalworking Machinery, N.E.C., had employment of 11.5 thousand. The leading States in employment in 1987 were Michigan, Illinois, Wisconsin, and Ohio, accounting for 53 percent of the industry's employment.

The total value of shipments for establishments classified in this industry was \$1.1 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3549 shipped \$898.8 million of metalworking machinery, n.e.c., products considered primary to the industry, \$112.7 million of secondary products, and had \$43.6 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 89 percent (specialization ratio).

Establishments in this industry also accounted for 88 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). The products primary to industry 3549, no matter in what industry they were produced, appear in table 6a and aggregate to \$1.0 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and electric energy used by establishments classified in the metalworking machinery, n.e.c., industry amounted to \$451.6 million. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with up to 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 15 percent of total value of shipments.

Table 1a-1. Historical Statistics for the Industry (1987 Basis): 1987 and Earlier Years

[Industries with only 1987 data are revised for 1987. Table 1a-2 contains historical data on the old SIC basis. See table 1c-1 for composition of the new industry on the old SIC basis. Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year <sup>1</sup>	Com- panies <sup>2</sup> (no.)	All establishments <sup>3</sup>		All employees		Production workers			Value added by manufac- ture <sup>4</sup> (million dollars)	Cost of materials <sup>5</sup> (million dollars)	Value of shipments (million dollars)	New capital expendi- tures <sup>6</sup> (million dollars)	End-of- year inven- tories <sup>4</sup> (million dollars)	Ratios	
		Total (no.)	With 20 employees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Speci- cializa- tion <sup>7</sup> (per- cent)	Cover- age <sup>8</sup> (per- cent)
<b>INDUSTRY 3541, MACHINE TOOLS, METAL CUTTING TYPES</b>															
1987 Census	9381	9417	232	31.7	921.5	18.2	35.4	465.7	1 668.7	1 399.5	3 189.5	61.1	1 056.8	83	93
1986 ASM	(NA)	(NA)	(NA)	38.6	1 088.8	22.0	43.6	557.0	1 823.8	1 538.0	3 456.1	62.7	1 215.6	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	42.8	1 127.6	24.9	47.7	592.6	2 000.0	1 471.6	3 377.0	91.6	1 349.7	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	42.4	1 053.9	24.7	46.5	541.7	1 820.0	1 369.5	3 211.6	108.8	1 196.5	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	43.0	997.1	24.5	45.9	512.1	1 612.7	1 100.0	2 880.9	104.8	1 281.6	(NA)	(NA)
1982 Census	865	942	293	58.3	1 335.0	33.9	63.6	709.2	2 516.2	1 598.3	4 411.5	157.7	1 435.5	91	93
1981 ASM	(NA)	(NA)	(NA)	74.3	1 633.0	47.9	98.5	964.1	3 739.9	2 187.3	5 865.3	232.3	1 485.5	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	72.8	1 504.0	47.8	98.8	889.5	3 349.2	2 026.1	5 227.6	171.6	1 419.4	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	69.1	1 304.1	45.7	95.9	786.9	2 833.8	1 736.9	4 389.0	147.6	1 242.2	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	64.3	1 120.7	42.2	88.2	679.6	2 267.0	1 417.7	3 611.8	102.0	1 012.3	(NA)	(NA)
1977 Census	872	917	306	59.4	949.0	37.2	76.3	540.7	1 866.1	1 047.7	2 812.7	80.4	877.9	87	92
1976 ASM	(NA)	(NA)	(NA)	58.1	845.4	37.6	73.5	473.9	1 664.1	852.3	2 496.2	65.2	735.4	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	62.8	850.3	40.8	81.7	486.8	1 640.3	1 050.3	2 727.8	52.2	737.9	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	65.0	874.4	43.9	92.5	509.8	1 617.0	1 017.9	2 480.5	58.9	786.2	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	59.9	709.4	39.8	83.3	417.9	1 214.1	764.1	1 891.1	38.4	591.9	(NA)	(NA)
1972 Census	857	894	275	52.5	573.8	33.4	68.2	325.9	901.7	536.3	1 418.1	35.2	482.2	86	90
<b>INDUSTRY 3542, MACHINE TOOLS, METAL FORMING TYPES</b>															
1987 Census	9196	9207	120	13.8	414.3	8.7	18.1	236.7	734.3	637.8	1 396.3	31.2	529.3	91	87
1986 ASM	(NA)	(NA)	(NA)	16.6	440.5	10.7	21.4	257.3	765.7	713.2	1 507.9	33.9	524.2	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	17.7	461.6	11.5	23.0	275.4	933.2	598.7	1 412.8	43.7	569.3	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	16.1	407.0	10.5	20.7	242.7	775.9	535.4	1 308.7	31.0	424.0	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	15.3	357.0	9.6	17.8	196.0	629.6	454.9	1 142.3	128.1	431.6	(NA)	(NA)
1982 Census	435	452	162	19.5	438.1	12.1	23.2	245.3	777.8	574.6	1 428.7	43.4	511.5	89	87
1981 ASM	(NA)	(NA)	(NA)	24.0	496.8	16.0	30.8	294.9	976.5	662.7	1 615.7	63.0	479.7	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	26.9	514.1	18.2	35.2	313.2	1 042.1	718.5	1 753.1	69.4	455.2	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	27.0	485.6	18.7	37.5	305.1	1 004.0	687.0	1 663.5	58.1	447.0	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	25.2	415.6	17.0	35.1	253.2	841.3	576.4	1 366.0	40.4	421.7	(NA)	(NA)
1977 Census	411	426	163	23.7	360.7	16.1	32.8	219.4	721.9	444.0	1 130.6	24.7	359.6	90	87
1976 ASM	(NA)	(NA)	(NA)	22.9	336.8	15.9	32.0	214.2	621.1	433.9	1 070.7	28.3	312.9	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	26.0	343.1	17.7	35.8	208.2	618.3	483.2	1 106.6	23.9	362.5	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	29.0	370.8	20.3	43.3	238.2	633.7	505.4	1 099.3	34.4	363.8	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	27.0	323.6	18.9	41.8	205.1	546.5	370.8	886.2	27.5	293.8	(NA)	(NA)
1972 Census	375	383	162	24.1	265.4	16.6	34.7	163.8	417.7	285.3	696.3	17.5	242.7	89	87
<b>INDUSTRY 3543, INDUSTRIAL PATTERNS<sup>11</sup></b>															
1987 Census	812	813	85	8.6	237.5	6.9	13.8	186.4	389.3	112.5	499.4	18.5	43.0	92	80
1986 ASM <sup>12</sup>	(NA)	(NA)	(NA)	6.9	191.7	5.8	12.3	155.3	384.9	216.8	590.4	14.1	43.6	(NA)	(NA)
1985 ASM <sup>12</sup>	(NA)	(NA)	(NA)	7.1	188.1	6.0	12.0	152.6	349.0	216.1	549.3	15.6	60.4	(NA)	(NA)
1984 ASM <sup>12</sup>	(NA)	(NA)	(NA)	7.0	173.7	5.8	11.1	137.0	312.2	186.3	461.1	11.4	45.5	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	10.2	218.9	8.3	14.9	177.2	311.8	112.2	417.2	104.4	32.9	(NA)	(NA)
1982 Census	994	996	105	9.8	217.6	8.1	14.8	173.4	347.6	97.6	452.3	15.8	29.6	97	76
1981 ASM <sup>12</sup>	(NA)	(NA)	(NA)	9.2	216.6	7.4	13.8	170.0	349.0	103.0	453.3	12.3	37.2	(NA)	(NA)
1980 ASM <sup>12</sup>	(NA)	(NA)	(NA)	9.6	183.1	7.6	13.5	145.3	310.7	113.8	415.2	(S)	35.8	(NA)	(NA)
1979 ASM <sup>12</sup>	(NA)	(NA)	(NA)	9.9	184.3	8.5	15.0	145.7	302.3	103.9	399.5	10.8	31.2	(NA)	(NA)
1978 ASM <sup>12</sup>	(NA)	(NA)	(NA)	9.4	167.0	8.0	15.5	130.1	268.6	73.8	335.6	17.1	30.1	(NA)	(NA)
1977 Census	1 001	1 002	115	9.3	152.7	8.0	15.8	122.2	252.5	72.0	320.6	11.1	25.2	97	75
1976 ASM	(NA)	(NA)	(NA)	8.5	140.0	7.1	15.5	113.4	211.5	61.1	273.3	14.2	20.3	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	8.9	138.7	7.2	15.8	112.4	219.8	63.6	287.9	12.2	19.4	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	10.0	144.0	8.2	17.6	115.9	247.6	67.0	313.1	6.5	28.6	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	9.2	117.1	7.9	15.1	96.7	185.1	41.4	224.1	5.0	15.0	(NA)	(NA)
1972 Census	1 017	1 021	97	8.5	103.1	7.4	13.9	85.3	161.0	38.8	198.0	5.3	12.9	95	78
<b>INDUSTRY 3544, SPECIAL DIES, TOOLS, JIGS, AND FIXTURES</b>															
1987 Census	7 207	7 317	1 517	114.4	3 163.6	87.7	185.5	2 251.2	5 293.8	2 227.0	7 550.1	375.3	952.1	94	92
1986 ASM	(NA)	(NA)	(NA)	108.9	3 000.1	85.7	179.4	2 165.1	5 582.2	2 158.1	7 725.1	333.6	913.6	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	110.6	2 904.4	88.6	183.3	2 123.1	5 222.2	2 069.9	7 204.8	401.8	861.5	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	111.2	2 737.8	89.7	188.1	2 021.3	4 681.5	2 010.7	6 614.7	398.8	703.2	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	97.9	2 294.4	78.2	161.1	1 662.5	3 801.7	1 537.1	5 310.6	192.4	590.5	(NA)	(NA)
1982 Census	7 132	7 255	1 322	102.9	2 293.3	81.7	164.9	1 684.9	3 780.5	1 535.4	5 374.9	232.9	621.8	94	79
1981 ASM	(NA)	(NA)	(NA)	124.2	2 632.4	99.6	209.3	1 905.7	4 423.7	1 884.8	6 264.3	275.9	693.1	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	126.3	2 471.0	101.6	214.3	1 798.7	4 121.0	1 734.3	5 823.9	283.5	646.3	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	122.1	2 231.2	98.9	214.5	1 641.7	3 810.6	1 607.5	5 336.2	294.4	574.7	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	112.5	1 946.6	92.7	195.2	1 419.9	3 183.2	1 424.2	4 585.1	228.9	510.2	(NA)	(NA)
1977 Census	7 034	7 153	1 427	105.7	1 708.2	86.4	184.0	1 261.7	2 790.1	1 171.8	3 905.3	177.5	450.3	94	79
1976 ASM	(NA)	(NA)	(NA)	109.9	1 537.0	88.7	179.4	1 163.2	2 502.1	951.0	3 411.6	168.9	370.3	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	102.9	1 336.6	83.8	168.7	1 005.8	2 141.8	824.7	2 985.6	114.4	315.8	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	117.4	1 486.6	97.2	205.7	1 134.4	2 459.5	928.8	3 367.5	193.1	328.3	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	105.7	1 314.8	87.4	193.6	999.9	2 256.2	782.8	2 930.7	101.7	300.4	(NA)	(NA)
1972 Census	6 513	6 616	1 266	97.8	1 113.8	80.5	173.3	843.6	1 797.4	648.0	2 423.7	97.0	244.1	94	78
<b>INDUSTRY 3545, MACHINE TOOL ACCESSORIES</b>															
1987 Census	91 734	91 879	564												

Table 1a-1. Historical Statistics for the Industry (1987 Basis): 1987 and Earlier Years—Con.

[Industries with only 1987 data are revised for 1987. Table 1a-2 contains historical data on the old SIC basis. See table 1c-1 for composition of the new industry on the old SIC basis. Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year <sup>1</sup>	Com- panies <sup>2</sup> (no.)	All establishments <sup>3</sup>		All employees		Production workers			Value added by manufac- ture <sup>4</sup> (million dollars)	Cost of materials <sup>5</sup> (million dollars)	Value of shipments (million dollars)	New capital expendi- tures <sup>6</sup> (million dollars)	End-of- year inven- tories <sup>7</sup> (million dollars)	Ratios	
		Total (no.)	With 20 employees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Speci- ciali- zation <sup>7</sup> (per- cent)	Cover- age <sup>8</sup> (per- cent)
<b>INDUSTRY 3545, MACHINE TOOL ACCESSORIES—Con.</b>															
1977 Census	1 270	1 411	491	54.0	762.0	39.9	80.1	498.0	1 584.8	832.5	2 383.0	77.2	468.3	89	88
1976 ASM	(NA)	(NA)	(NA)	51.0	634.4	37.6	73.5	414.4	1 293.4	653.6	1 942.3	51.5	406.0	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	52.4	616.4	38.2	77.1	405.3	1 236.2	599.1	1 847.8	50.3	411.4	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	56.1	625.6	41.7	86.9	422.7	1 322.0	609.8	1 884.1	59.5	425.2	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	52.8	569.3	39.2	81.4	380.6	1 142.6	496.4	1 602.4	36.6	344.4	(NA)	(NA)
1972 Census	1 113	1 231	413	46.7	456.6	33.6	67.0	294.5	876.1	378.5	1 243.4	30.2	289.0	86	87
<b>INDUSTRY 3546, POWER-DRIVEN HANDTOOLS</b>															
1987 Census	183	199	68	16.8	382.8	11.7	22.3	222.3	1 125.0	1 045.9	2 161.8	46.2	361.2	83	85
1986 ASM	(NA)	(NA)	(NA)	17.9	383.8	12.5	24.0	229.3	1 121.5	998.3	2 142.4	42.1	362.1	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	19.2	398.4	13.2	23.9	240.1	1 141.3	996.2	2 155.1	80.3	388.9	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	20.0	392.2	14.2	26.4	245.1	1 088.8	965.9	2 016.3	50.6	423.1	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	19.5	385.1	13.3	24.9	223.2	1 015.9	788.7	1 801.9	45.4	398.8	(NA)	(NA)
1982 Census	180	203	74	21.6	393.6	14.5	25.9	228.6	940.3	791.5	1 795.3	68.1	415.0	88	91
1981 ASM	(NA)	(NA)	(NA)	26.0	434.2	18.5	35.7	279.4	1 264.1	931.5	2 144.7	79.3	489.7	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	30.5	440.0	22.5	41.5	289.9	1 294.6	1 002.1	2 298.8	82.9	448.0	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	32.3	446.8	24.0	45.9	301.2	1 205.2	1 015.9	2 197.2	85.1	446.1	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	29.8	377.5	21.9	41.8	244.1	1 069.2	870.9	1 929.1	49.9	352.9	(NA)	(NA)
1977 Census	99	124	71	27.7	325.7	20.0	38.5	210.4	931.9	703.2	1 623.2	39.0	326.0	91	90
1976 ASM	(NA)	(NA)	(NA)	22.0	261.8	15.9	30.4	165.6	702.5	452.7	1 140.7	21.1	262.5	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	21.2	219.9	14.7	27.4	136.8	603.8	418.1	1 059.2	22.3	271.4	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	26.1	252.7	19.3	37.4	167.3	721.6	436.5	1 119.6	35.5	316.5	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	26.5	249.0	18.8	37.3	159.8	562.0	397.1	921.4	25.6	265.1	(NA)	(NA)
1972 Census	71	88	65	23.1	202.3	16.9	32.9	124.2	434.5	302.7	730.5	20.3	199.7	82	92
<b>INDUSTRY 3547, ROLLING MILL MACHINERY</b>															
1987 Census	83	86	34	3.9	120.7	2.2	4.7	57.4	284.9	249.7	467.8	7.1	170.6	92	94
1986 ASM	(NA)	(NA)	(NA)	3.5	101.1	1.9	3.8	46.9	169.6	209.7	380.8	3.6	94.3	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	3.9	106.7	2.2	4.4	53.8	196.7	213.0	453.7	9.2	85.7	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	3.3	89.3	2.0	3.8	45.5	192.8	168.5	323.1	6.0	128.4	(NA)	(NA)
1983 ASM <sup>12</sup>	(NA)	(NA)	(NA)	4.1	94.1	2.5	4.5	51.5	114.2	182.0	373.6	5.3	109.7	(NA)	(NA)
1982 Census	58	63	32	5.1	125.1	3.3	6.1	70.8	276.4	246.8	502.9	14.8	168.1	79	79
1981 ASM	(NA)	(NA)	(NA)	6.0	135.1	3.9	7.6	81.9	410.4	341.4	736.3	8.3	161.5	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	6.4	139.4	4.5	8.6	87.3	358.1	314.3	687.1	12.8	132.0	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	6.1	119.3	4.2	8.7	76.9	296.1	232.3	481.9	1030.9	154.0	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	7.6	137.6	5.3	9.3	83.6	289.7	189.3	495.2	7.6	118.8	(NA)	(NA)
1977 Census	58	63	38	7.9	128.2	5.4	10.4	78.4	286.9	198.3	507.4	9.1	131.8	78	86
1976 ASM	(NA)	(NA)	(NA)	10.9	156.2	7.8	14.8	99.3	350.9	247.4	620.8	14.5	168.4	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	10.6	141.1	8.0	15.2	95.3	331.0	259.7	540.5	12.1	181.1	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	10.3	132.9	8.1	16.1	92.6	297.1	202.0	472.2	11.1	136.0	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	9.2	108.1	7.1	14.3	73.1	244.6	152.6	377.2	7.7	106.6	(NA)	(NA)
1972 Census	40	47	38	10.4	115.2	7.2	14.2	68.7	206.4	129.0	327.8	6.3	81.0	74	86
<b>INDUSTRY 3548, WELDING APPARATUS<sup>13</sup></b>															
1987 Census	203	225	130	18.7	541.5	11.5	24.2	292.9	1 084.4	1 062.1	2 104.6	45.4	556.4	90	92
<b>INDUSTRY 3549, METALWORKING MACHINERY, N.E.C.<sup>13</sup></b>															
1987 Census	293	302	147	11.5	338.8	7.0	14.7	181.9	593.3	451.6	1 055.0	21.4	265.8	89	88

<sup>1</sup>In annual survey of manufactures (ASM) years, data are estimates based on a representative sample of establishments canvassed annually and may differ from results of a complete canvass of all establishments. ASM publication shows percentage standard errors. Unless otherwise noted, for data prior to 1972, see 1972 Census of Manufactures, vol. II, table 1a of the Industry chapter.

<sup>2</sup>For the Census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

<sup>3</sup>Includes establishments with payroll at any time during year.

<sup>4</sup>Beginning with the 1982 Census of Manufactures, all respondents were requested to report their inventories at (the lower of) cost or market prior to adjustment to LIFO cost. This is a change from prior Censuses and annual surveys of manufactures in which respondents were permitted to value their inventories using any generally accepted accounting method. Consequently, inventories and value added by manufacture are not comparable to prior-year data.

<sup>5</sup>Detailed data on materials consumed by type are shown in table 7c.

<sup>6</sup>Detailed data on new machinery and equipment expenditures are provided in table 3c.

<sup>7</sup>Represents ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for establishments classified in the industry.

<sup>8</sup>Represents ratio of primary products shipped by establishments classified in industry to total shipments of such products by all manufacturing establishments, wherever classified.

<sup>9</sup>For 1987, company and total establishment counts are not directly comparable to prior-years' data. Prior to the 1987 Census of Manufactures, these data included small nonmailed companies (typically with less than 10 employees) classified from administrative records of other Federal agencies and estimated from industry averages. For 1987, these companies were reclassified to SIC industry 3545, Machine Tool Accessories and total 909. In 1982, there were 545, 195, and 524 of these companies classified in SIC industries 3541, 3542, and 3545, respectively, accounting for approximately 3 percent of the value of shipments and value added data.

<sup>10</sup>Estimates for new capital expenditures have associated standard errors of 15 percent or more and may be of limited reliability. Estimates for other data items are of acceptable reliability.

<sup>11</sup>Although there was no change in definition or content, 1972 SIC Industry 3565, Industrial Patterns, was renumbered to 1987 SIC Industry 3543.

<sup>12</sup>Data either have associated standard errors exceeding 15 percent or are not consistent with other census series and related data; thus these estimates may be of limited reliability.

<sup>13</sup>Industry definition is new for 1987 Census of Manufactures. An explanation of the Standard Industrial Classification revision appears in the Summary of Findings of this report.

Table 1a-2. Historical Statistics for the Industry (1972 Basis): 1987 and Earlier Years

[Table 1a-2 contains the historical data on the old SIC basis. See table 1c-1 for composition of the new industry on the old SIC basis. Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Com- panies (no.)	All establishments		All employees		Production workers			Value added by manufac- ture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expendi- tures (million dollars)	End-of- year inven- tories (million dollars)	Ratios	
		Total (no.)	With 20 employ- ees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Spec- cial- ization (per- cent)	Cover- age (per- cent)
<b>INDUSTRY 3549, METALWORKING MACHINERY, N.E.C.</b>															
1987 Census	394	419	207	18.8	521.2	11.1	22.6	264.2	1 099.9	782.0	1 882.8	45.5	447.3	(NA)	(NA)
1986 ASM	(NA)	(NA)	(NA)	20.0	497.0	12.9	26.5	275.4	938.9	823.2	1 811.8	35.1	409.2	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	20.8	505.1	13.8	27.6	283.1	1 063.1	778.8	1 788.2	48.6	452.4	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	21.5	495.6	14.1	27.9	271.8	1 003.2	765.7	1 727.5	56.2	436.1	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	18.8	409.8	11.9	22.6	215.7	763.9	550.0	1 356.5	31.4	366.6	(NA)	(NA)
1982 Census	421	446	197	20.7	431.5	13.0	25.4	233.3	829.9	600.0	1 471.1	52.4	337.6	86	85
1981 ASM	(NA)	(NA)	(NA)	25.0	476.4	16.1	33.6	261.0	950.3	724.4	1 655.7	1064.8	412.5	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	24.8	448.5	16.2	33.1	244.5	939.3	665.9	1 550.5	1082.5	386.5	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	24.0	395.0	16.3	32.9	220.5	815.7	572.9	1 340.9	1061.9	331.4	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	20.6	316.2	13.6	26.8	175.5	637.9	471.3	1 106.1	1028.0	247.7	(NA)	(NA)
1977 Census	521	534	183	19.4	279.5	12.8	25.2	154.1	562.2	389.1	916.8	30.7	233.8	88	82
1976 ASM	(NA)	(NA)	(NA)	14.7	182.1	9.9	19.5	101.4	324.5	275.7	595.9	13.5	151.8	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	14.5	163.8	9.4	18.2	88.5	290.3	261.5	571.5	19.4	149.7	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	15.6	167.2	11.0	21.3	95.9	345.0	264.9	587.0	17.9	178.8	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	15.1	153.3	10.1	20.7	91.9	314.5	203.0	490.2	18.9	133.8	(NA)	(NA)
1972 Census	384	393	134	13.6	131.5	9.2	18.3	77.6	267.9	165.4	427.3	12.3	107.6	88	83
<b>INDUSTRY 3623, WELDING APPARATUS, ELECTRIC</b>															
1987 Census	150	163	94	14.2	439.3	9.1	19.3	244.8	809.4	882.9	1 654.2	36.6	446.5	(NA)	(NA)
1986 ASM	(NA)	(NA)	(NA)	14.1	398.0	9.0	17.9	212.4	766.7	716.6	1 493.6	23.8	340.8	(NA)	(NA)
1985 ASM	(NA)	(NA)	(NA)	14.9	395.1	9.6	18.6	222.6	817.8	754.0	1 585.7	32.8	372.6	(NA)	(NA)
1984 ASM	(NA)	(NA)	(NA)	14.6	363.4	9.5	18.1	215.4	736.2	730.9	1 459.1	33.1	374.3	(NA)	(NA)
1983 ASM	(NA)	(NA)	(NA)	13.7	300.1	8.2	14.4	162.8	568.6	577.9	1 195.1	26.8	327.9	(NA)	(NA)
1982 Census	164	182	108	15.0	340.8	10.0	17.8	204.8	684.2	643.8	1 353.2	44.4	372.7	89	94
1981 ASM	(NA)	(NA)	(NA)	17.5	425.5	11.7	24.4	252.4	804.4	966.5	1 753.7	1060.8	352.3	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	17.8	372.4	11.5	23.1	228.5	703.1	809.8	1 511.2	36.6	312.7	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	18.8	364.5	11.9	24.4	213.4	734.9	791.8	1 499.8	31.7	315.0	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	18.7	332.0	12.2	24.6	196.5	655.6	717.4	1 361.3	32.0	279.2	(NA)	(NA)
1977 Census	161	176	88	17.5	285.7	11.3	23.0	165.1	582.7	634.2	1 191.2	38.7	258.3	86	94
1976 ASM	(NA)	(NA)	(NA)	16.1	236.8	10.6	21.0	138.4	481.9	523.2	1 001.8	19.2	218.9	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	17.0	238.2	11.0	22.3	141.1	511.5	525.4	1 039.6	18.7	221.8	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	18.2	236.9	12.3	25.8	145.2	522.9	523.0	1 008.9	18.2	233.7	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	16.2	192.3	10.8	23.2	120.3	374.0	375.4	748.1	11.5	160.2	(NA)	(NA)
1972 Census	154	166	80	15.5	173.9	9.8	20.9	102.5	353.5	314.2	659.6	11.4	149.3	84	92

Note: For qualifications of data, see footnotes on table 1a-1.

Table 1b-1. Selected Operating Ratios for the Industry (1987 Basis): 1987 and Earlier Years

[Industries with only 1987 data are revised for 1987. Table 1b-2 contains historical data on the old SIC basis. See table 1c-1 for composition of the new industry on the old SIC basis. Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
<b>INDUSTRY 3541, MACHINE TOOLS, METAL CUTTING TYPES</b>									
1987 Census	29 069	57	1 945	13.16	44	73	52 640	55	47.14
1986 ASM	28 207	57	1 982	12.78	45	76	47 249	60	41.83
1985 ASM	26 345	58	1 916	12.42	44	77	46 729	56	41.93
1984 ASM	24 856	58	1 883	11.65	43	75	42 925	58	39.14
1983 ASM	23 188	57	1 873	11.16	38	73	37 505	62	35.14
1982 Census	22 898	58	1 876	11.15	36	66	43 160	53	39.56
1981 ASM	21 978	64	2 056	9.79	37	65	50 335	44	37.97
1980 ASM	20 659	66	2 067	9.00	39	68	46 005	45	33.90
1979 ASM	18 872	66	2 098	8.21	40	69	41 010	46	29.55
1978 ASM	17 429	66	2 090	7.71	39	70	35 257	49	25.70
1977 Census	15 976	63	2 051	7.09	37	71	31 416	51	24.46
1976 ASM	14 550	65	1 955	6.45	34	68	28 642	51	22.64
1975 ASM	13 539	65	2 002	5.96	39	70	26 119	52	20.08
1974 ASM	13 452	68	2 107	5.51	41	76	24 877	54	17.48
1973 ASM	11 843	66	2 093	5.02	40	78	20 269	58	14.58
1972 Census	10 929	64	2 042	4.78	38	78	17 175	64	13.22

See footnotes at end of table.

Table 1b-1. Selected Operating Ratios for the Industry (1987 Basis): 1987 and Earlier Years  
—Con.

[Industries with only 1987 data are revised for 1987. Table 1b-2 contains historical data on the old SIC basis. See table 1c-1 for composition of the new industry on the old SIC basis. Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
<b>INDUSTRY 3542, MACHINE TOOLS, METAL FORMING TYPES</b>									
1987 Census-----	30 022	63	2 080	13.08	46	75	53 210	56	40.57
1986 ASM-----	26 536	64	2 000	12.02	47	77	46 127	58	35.78
1985 ASM-----	26 079	65	2 000	11.97	42	75	52 723	49	40.57
1984 ASM-----	25 279	65	1 971	11.72	41	72	48 193	52	37.48
1983 ASM-----	23 333	63	1 854	11.01	40	71	41 150	57	35.37
1982 Census-----	22 466	62	1 917	10.57	40	71	39 887	56	33.53
1981 ASM-----	20 700	67	1 925	9.57	41	72	40 688	51	31.70
1980 ASM-----	19 111	68	1 934	8.90	41	70	38 740	49	29.61
1979 ASM-----	17 985	69	2 005	8.14	41	70	37 185	48	26.77
1978 ASM-----	16 492	67	2 065	7.21	42	73	33 385	49	23.97
1977 Census-----	15 219	68	2 037	6.69	39	71	30 460	50	22.01
1976 ASM-----	14 707	69	2 013	6.69	41	72	27 122	54	19.41
1975 ASM-----	13 196	68	2 023	5.82	44	75	23 781	55	17.27
1974 ASM-----	12 726	70	2 133	5.50	46	80	21 852	59	14.64
1973 ASM-----	11 985	70	2 212	4.91	42	78	20 241	59	13.07
1972 Census-----	11 012	69	2 090	4.72	41	79	17 332	64	12.04
<b>INDUSTRY 3543, INDUSTRIAL PATTERNS</b>									
1987 Census-----	27 616	80	2 000	13.51	23	70	45 267	61	28.21
1986 ASM-----	27 782	84	2 121	12.63	37	69	55 783	50	31.29
1985 ASM-----	26 492	85	2 000	12.72	39	74	49 155	54	29.08
1984 ASM-----	24 814	83	1 914	12.34	40	78	44 600	56	28.13
1983 ASM-----	21 460	81	1 795	11.89	27	79	30 569	70	20.93
1982 Census-----	22 204	83	1 827	11.72	22	70	35 469	63	23.49
1981 ASM-----	23 543	80	1 865	12.32	23	71	37 935	62	25.29
1980 ASM-----	19 072	79	(S)	10.76	27	72	32 365	59	23.01
1979 ASM-----	18 616	86	1 765	9.71	26	72	30 535	61	20.15
1978 ASM-----	17 765	85	1 938	8.39	22	72	28 574	62	17.33
1977 Census-----	16 419	86	1 975	7.73	22	70	27 151	60	15.98
1976 ASM-----	16 470	84	2 183	7.32	22	74	24 882	66	13.65
1975 ASM-----	15 584	81	2 194	7.11	22	70	24 697	63	13.91
1974 ASM-----	14 400	82	2 146	6.59	21	67	24 760	58	14.07
1973 ASM-----	12 728	86	1 911	6.40	18	71	20 120	63	12.26
1972 Census-----	12 129	87	1 878	6.14	20	72	18 941	64	11.58
<b>INDUSTRY 3544, SPECIAL DIES, TOOLS, JIGS, AND FIXTURES</b>									
1987 Census-----	27 654	77	2 115	12.14	29	71	46 274	60	28.54
1986 ASM-----	27 549	79	2 093	12.07	28	67	51 260	54	31.12
1985 ASM-----	26 260	80	2 069	11.58	29	69	47 217	56	28.49
1984 ASM-----	24 620	81	2 097	10.75	30	72	42 100	58	24.89
1983 ASM-----	23 436	80	2 060	10.32	29	72	38 832	60	23.60
1982 Census-----	22 286	79	2 018	10.22	29	71	36 740	61	22.93
1981 ASM-----	21 194	80	2 101	9.11	30	72	35 618	60	21.14
1980 ASM-----	19 564	80	2 109	8.39	30	72	32 629	60	19.23
1979 ASM-----	18 273	81	2 169	7.65	30	72	31 209	59	17.77
1978 ASM-----	17 303	82	2 106	7.27	31	74	28 295	61	16.31
1977 Census-----	16 160	82	2 130	6.86	30	74	26 396	61	15.16
1976 ASM-----	13 985	81	2 023	6.48	28	73	22 767	61	13.95
1975 ASM-----	12 989	81	2 013	5.96	28	72	20 814	62	12.70
1974 ASM-----	12 662	83	2 116	5.51	28	72	20 950	60	11.96
1973 ASM-----	12 438	83	2 215	5.16	27	72	21 345	58	11.65
1972 Census-----	11 388	82	2 153	4.87	27	73	18 378	62	10.37
<b>INDUSTRY 3545, MACHINE TOOL ACCESSORIES</b>									
1987 Census-----	24 471	72	2 029	10.66	29	62	52 909	46	36.07
1986 ASM-----	23 680	72	2 009	10.55	29	61	51 568	46	35.49
1985 ASM-----	22 257	74	2 011	9.81	30	61	49 174	45	33.19
1984 ASM-----	21 977	73	2 011	9.77	29	61	49 145	45	33.42
1983 ASM-----	20 266	69	1 917	9.68	30	66	38 518	53	29.06
1982 Census-----	19 413	70	1 894	9.39	31	65	39 279	49	29.45
1981 ASM-----	19 268	74	1 989	8.58	35	64	43 432	44	29.65
1980 ASM-----	17 738	74	1 993	7.91	35	64	41 124	43	27.88
1979 ASM-----	16 327	76	2 044	7.09	35	65	37 544	43	24.30
1978 ASM-----	15 331	75	2 025	6.81	34	65	33 845	45	22.26
1977 Census-----	14 111	74	2 008	6.22	25	67	29 348	48	19.79
1976 ASM-----	12 439	74	1 955	5.64	34	66	25 361	49	17.60
1975 ASM-----	11 763	73	2 018	5.26	32	66	23 592	50	16.03
1974 ASM-----	11 151	74	2 084	4.86	32	66	23 565	47	15.21
1973 ASM-----	10 782	74	2 077	4.68	31	67	21 640	50	14.04
1972 Census-----	9 777	72	1 994	4.40	30	67	18 760	52	13.08
<b>INDUSTRY 3546, POWER-DRIVEN HANDTOOLS</b>									
1987 Census-----	22 786	70	1 906	9.97	48	66	66 964	34	50.45
1986 ASM-----	21 441	70	1 920	9.55	47	65	62 654	34	46.73
1985 ASM-----	20 750	69	1 811	10.05	46	65	59 443	35	47.75
1984 ASM-----	19 610	71	1 859	9.28	48	67	54 440	36	41.24
1983 ASM-----	19 748	68	1 872	8.96	44	65	52 097	38	40.80
1982 Census-----	18 222	67	1 786	8.83	44	66	43 532	42	36.31
1981 ASM-----	16 700	71	1 930	7.83	43	64	48 619	34	35.41
1980 ASM-----	14 426	74	1 844	6.99	44	63	42 446	34	31.20
1979 ASM-----	13 832	74	1 913	6.56	46	67	37 313	37	26.26
1978 ASM-----	12 667	73	1 909	5.84	45	65	35 879	35	25.58

See footnotes at end of table.

Table 1b-1. Selected Operating Ratios for the Industry (1987 Basis): 1987 and Earlier Years

—Con.

[Industries with only 1987 data are revised for 1987. Table 1b-2 contains historical data on the old SIC basis. See table 1c-1 for composition of the new industry on the old SIC basis. Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
<b>INDUSTRY 3546, POWER-DRIVEN HANDTOOLS—Con.</b>									
1977 Census.....	11 758	72	1 925	5.46	43	63	33 643	35	24.21
1976 ASM.....	11 900	72	1 912	5.45	40	63	31 932	37	23.11
1975 ASM.....	10 372	69	1 864	4.99	39	60	28 481	36	22.04
1974 ASM.....	9 681	74	1 938	4.47	39	62	27 648	35	19.29
1973 ASM.....	9 396	71	1 984	4.28	43	70	21 208	44	15.07
1972 Census.....	8 757	73	1 947	3.78	41	69	18 810	47	13.21
<b>INDUSTRY 3547, ROLLING MILL MACHINERY</b>									
1987 Census.....	30 949	56	2 136	12.21	53	79	73 051	42	60.62
1986 ASM.....	28 885	54	2 000	12.34	55	82	48 457	60	44.63
1985 ASM.....	27 358	56	2 000	12.23	47	70	50 436	54	44.70
1984 ASM.....	27 060	61	1 900	11.97	52	80	58 424	46	50.74
1983 ASM.....	22 951	61	1 800	11.44	49	74	27 854	82	25.38
1982 Census.....	24 529	65	1 848	11.61	49	74	54 196	45	45.31
1981 ASM.....	22 516	65	1 949	10.78	46	65	68 400	33	54.00
1980 ASM.....	21 781	70	1 911	10.15	46	66	55 953	39	41.64
1979 ASM.....	19 557	69	2 071	8.84	48	73	48 541	40	34.03
1978 ASM.....	18 105	70	1 755	8.99	38	66	38 118	47	31.15
1977 Census.....	16 227	68	1 926	7.54	39	64	36 316	45	27.59
1976 ASM.....	14 330	72	1 897	6.71	40	65	32 193	45	23.71
1975 ASM.....	13 311	75	1 900	6.27	48	74	31 226	43	21.78
1974 ASM.....	12 902	79	1 988	5.75	43	71	28 845	45	18.45
1973 ASM.....	11 750	77	2 014	5.11	40	69	26 587	44	17.10
1972 Census.....	11 076	69	1 972	4.84	39	74	19 846	56	14.54
<b>INDUSTRY 3548, WELDING APPARATUS</b>									
1987 Census.....	28 957	61	2 104	12.10	50	76	57 989	50	44.81
<b>INDUSTRY 3549, METALWORKING MACHINERY, N.E.C.</b>									
1987 Census.....	29 461	61	2 100	12.37	43	75	51 591	57	40.36

Note: For qualifications of data, see footnotes on table 1a-1.

Table 1b-2. Selected Operating Ratios for the Industry (1972 Basis): 1987 and Earlier Years

[Table 1b-2 contains the historical data on the old SIC basis. See table 1c-1 for composition of the new industry on the old SIC basis. Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
<b>INDUSTRY 3549, METALWORKING MACHINERY, N.E.C.</b>									
1987 Census.....	27 723	59	2 036	11.69	42	69	58 505	47	48.67
1986 ASM.....	24 850	65	2 054	10.39	45	73	46 945	53	35.43
1985 ASM.....	24 283	66	2 000	10.26	44	72	51 111	48	38.52
1984 ASM.....	23 051	66	1 979	9.74	44	73	46 660	49	35.96
1983 ASM.....	21 797	63	1 899	9.54	41	71	40 633	54	33.80
1982 Census.....	20 845	63	1 954	9.19	41	70	40 092	52	32.67
1981 ASM.....	19 056	64	2 087	7.77	44	73	38 012	50	28.28
1980 ASM.....	18 084	65	2 043	7.39	43	72	37 875	48	28.38
1979 ASM.....	16 458	68	2 018	6.70	43	72	33 988	48	24.79
1978 ASM.....	15 349	66	1 971	6.55	43	71	30 966	50	23.80
1977 Census.....	14 407	66	1 969	6.12	42	73	28 979	50	22.31
1976 ASM.....	12 387	67	1 970	5.20	46	77	22 075	56	16.64
1975 ASM.....	11 296	65	1 936	4.86	46	74	20 021	56	15.95
1974 ASM.....	10 717	71	1 936	4.50	45	74	22 115	48	16.20
1973 ASM.....	10 152	67	2 050	4.44	41	73	20 828	49	15.19
1972 Census.....	9 669	68	1 989	4.24	39	69	19 699	49	14.64
<b>INDUSTRY 3623, WELDING APPARATUS, ELECTRIC</b>									
1987 Census.....	30 937	64	2 121	12.68	53	80	57 000	54	41.94
1986 ASM.....	28 226	64	1 989	11.87	48	75	54 376	52	42.83
1985 ASM.....	26 516	64	1 938	11.97	48	72	54 886	48	43.97
1984 ASM.....	24 890	65	1 905	11.90	50	75	50 425	49	40.67
1983 ASM.....	21 905	60	1 756	11.31	48	73	41 504	53	39.49
1982 Census.....	22 720	67	1 780	11.51	48	73	45 613	50	38.44
1981 ASM.....	24 314	67	2 085	10.34	55	79	45 966	53	32.97
1980 ASM.....	20 921	65	2 009	9.89	54	78	39 500	53	30.44
1979 ASM.....	19 388	63	2 050	8.75	53	77	39 090	50	30.12
1978 ASM.....	17 754	65	2 016	7.99	53	77	35 059	51	26.65

See footnotes at end of table.

Table 1b-2. Selected Operating Ratios for the Industry (1972 Basis): 1987 and Earlier Years

—Con.

[Table 1b-2 contains the historical data on the old SIC basis. See table 1c-1 for composition of the new industry on the old SIC basis. Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
<b>INDUSTRY 3623, WELDING APPARATUS, ELECTRIC—Con.</b>									
1977 Census-----	16 325	65	2 035	7.18	53	77	33 297	49	25.33
1976 ASM-----	14 708	66	1 981	6.59	52	76	29 932	49	22.95
1975 ASM-----	14 011	65	2 027	6.33	51	73	30 088	47	22.94
1974 ASM-----	13 016	68	2 098	5.63	52	75	28 731	45	20.27
1973 ASM-----	11 870	67	2 148	5.19	50	76	23 086	51	16.12
1972 Census-----	11 219	63	2 133	4.90	48	74	22 806	49	16.91

Note: For qualifications of data, see footnotes on table 1a-1.

Table 1c-1. 1987 Statistics for the Industry Showing the Distribution of 1987 SIC-Based Industries Among 1972 SIC-Based Industries

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry	All establish- ments (number)	All employees		Production workers			Value added by manufac- ture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expend- itures (million dollars)	End-of- year invento- ries (million dollars)
		Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
New Industry 3548, Welding Apparatus-----	225	18.7	541.5	11.5	24.2	292.9	1 084.4	1 062.1	2 104.6	45.4	556.4
Old Industry 3549, Metalworking Machinery, N.E.C.-----	62	4.4	102.1	2.5	4.9	48.1	275.1	179.2	450.5	8.8	109.8
Old Industry 3623, Welding Apparatus, Electric-----	163	14.2	439.3	9.1	19.3	244.8	809.4	882.9	1 654.2	36.6	446.5
New Industry 3549, Metalworking Machinery, N.E.C.-----	302	11.5	338.8	7.0	14.7	181.9	593.3	451.6	1 055.0	21.4	265.8
Old Industry 3549, Metalworking Machinery, N.E.C.-----	302	11.5	338.8	7.0	14.7	181.9	593.3	451.6	1 055.0	21.4	265.8

Note: For qualifications of data, see footnotes on table 1a-1.

Table 1c-2. 1987 Statistics for the Industry Showing the Distribution of 1972 SIC-Based Industries Among 1987 SIC-Based Industries

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry	All establish- ments (number)	All employees		Production workers			Value added by manufac- ture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expend- itures (million dollars)	End-of- year invento- ries (million dollars)
		Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
Old Industry 3549, Metalworking Machinery, N.E.C.-----	419	18.8	521.2	11.1	22.6	264.2	1 099.9	782.0	1 882.8	45.5	447.3
New Industry 3548, Welding Apparatus-----	62	4.4	102.1	2.5	4.9	48.1	275.1	179.2	450.5	8.8	109.8
New Industry 3549, Metalworking Machinery, N.E.C.-----	302	11.5	338.8	7.0	14.7	181.9	593.3	451.6	1 055.0	21.4	265.8
New Industry 3559, Special Industry Machinery, N.E.C.-----	54	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
New Industry 3699, Electrical Equipment and Supplies, N.E.C.-----	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Old Industry 3623, Welding Apparatus, Electric-----	163	14.2	439.3	9.1	19.3	244.8	809.4	882.9	1 654.2	36.6	446.5
New Industry 3548, Welding Apparatus-----	163	14.2	439.3	9.1	19.3	244.8	809.4	882.9	1 654.2	36.6	446.5

Note: For qualifications of data, see footnotes on table 1a-1.

Table 2. Industry Statistics for Selected States: 1987 and 1982

[Excludes data for auxiliaries. States with 150 employees or more are shown. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1987											1982		
	All establishments		All employees		Production workers			Value added by manufacturer (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees <sup>2</sup> (1,000)	Value added by manufacturer (million dollars)	
	E1	Total (no.)	With 20 employees or more (no.)	Number <sup>2</sup> (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)							
<b>INDUSTRY 3541, MACHINE TOOLS, METAL CUTTING TYPES</b>														
United States	-	417	232	31.7	921.5	18.2	35.4	465.7	1 668.7	1 399.5	3 189.5	61.1	58.3	2 516.2
California	E1	33	8	.7	19.9	.5	1.0	11.2	38.7	36.6	73.7	1.6	1.4	50.4
Connecticut	-	24	12	2.2	63.4	1.3	2.7	34.3	96.3	99.3	212.8	2.7	5.1	180.4
Florida	-	5	2	.2	3.9	.1	.2	2.3	5.6	2.9	8.3	.2	.2	5.3
Illinois	-	41	22	3.4	102.7	1.8	3.0	44.1	202.2	140.8	332.1	(D)	5.4	207.9
Indiana	-	10	7	.7	19.8	.4	.9	9.1	25.3	34.7	64.4	.9	1.3	35.7
Iowa	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Kansas	E2	3	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Kentucky	-	2	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Massachusetts	-	17	8	1.2	36.3	.7	1.4	17.5	61.4	39.8	104.4	1.6	2.6	114.4
Michigan	-	104	56	4.5	153.9	2.8	5.9	79.0	299.8	310.3	670.6	9.9	8.9	491.1
Minnesota	-	13	8	.9	23.5	.5	1.0	11.4	46.3	38.1	83.7	2.6	1.2	49.0
New Hampshire	-	2	2	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
New Jersey	E1	12	6	.4	11.4	.3	.6	7.0	20.7	11.5	31.3	.1	.4	17.1
New York	-	16	12	3.2	88.5	2.0	3.6	49.4	162.6	75.9	249.4	12.6	4.9	176.2
North Carolina	-	4	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	8.2
Ohio	-	43	25	5.9	176.0	3.1	5.9	86.6	298.4	276.5	598.4	(D)	12.3	547.2
Oregon	-	5	3	.2	4.4	.1	.2	2.0	9.1	4.5	13.4	(D)	(NA)	(NA)
Pennsylvania	-	17	13	1.1	28.9	.6	1.3	14.4	52.7	34.6	85.3	2.3	2.1	86.2
Rhode Island	-	6	4	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
South Carolina	-	4	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Vermont	-	3	3	.9	22.1	.5	1.1	11.5	35.4	20.0	63.6	(D)	2.6	90.7
Virginia	-	3	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Wisconsin	E1	21	13	2.2	63.6	1.1	2.2	28.8	143.5	68.2	221.1	6.1	3.4	254.6
<b>INDUSTRY 3542, MACHINE TOOLS, METAL FORMING TYPES</b>														
United States	E1	207	120	13.8	414.3	8.7	18.1	236.7	734.3	637.8	1 396.3	31.2	19.5	777.8
California	E1	19	9	.8	23.9	.4	.9	11.7	43.6	50.2	97.5	(D)	1.0	38.0
Colorado	-	2	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Connecticut	E1	9	3	.3	10.8	.2	.4	5.8	16.9	7.5	25.1	(D)	.8	27.7
Illinois	-	27	20	3.6	107.4	2.2	4.6	63.1	137.7	145.4	322.5	7.1	4.4	231.6
Indiana	E3	9	6	.3	9.4	.2	.4	5.2	16.7	11.0	26.9	.6	BB	(D)
Kansas	-	4	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.3	10.2
Massachusetts	E1	3	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Michigan	E1	37	19	1.8	54.3	1.2	2.8	35.7	108.4	80.7	190.8	3.9	1.6	67.4
Missouri	-	5	3	2	4.0	.1	.3	3.4	6.3	5.1	11.7	(D)	.3	9.4
New Jersey	E7	9	4	.3	9.5	.2	.4	5.7	15.0	13.8	28.6	.3	BB	(D)
New York	E1	8	5	1.1	36.8	.6	1.4	17.3	70.6	46.3	118.8	1.0	1.7	49.3
North Carolina	E3	4	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Ohio	-	27	16	2.9	91.6	1.8	3.5	49.7	193.9	126.3	303.3	7.7	4.4	173.0
Pennsylvania	-	7	6	.5	14.9	.3	.6	6.7	13.7	49.6	69.9	1.1	EE	(D)
Virginia	-	3	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
<b>INDUSTRY 3543, INDUSTRIAL PATTERNS</b>														
United States	E1	813	85	8.6	237.5	6.9	13.8	186.4	389.3	112.5	499.4	18.5	9.8	347.6
Alabama	-	13	3	.2	5.5	.2	.3	4.4	10.4	3.6	15.6	(D)	BB	(D)
California	E4	76	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.7	23.0
Illinois	E2	64	4	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.8	27.6
Indiana	E2	29	9	.4	10.4	.3	.6	8.5	17.6	4.5	21.8	1.1	.5	17.1
Michigan	-	111	24	1.9	72.1	1.5	3.2	55.2	109.6	26.2	134.3	4.7	1.9	81.0
Minnesota	E1	18	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	8.5
Missouri	E5	15	2	.2	4.5	.1	.3	3.4	7.4	2.7	10.2	.6	AA	(D)
New York	E5	38	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.5	15.8
Ohio	E1	104	9	1.2	32.3	1.0	2.1	26.0	56.9	12.4	69.3	2.5	EE	(D)
Oregon	E2	16	3	.2	4.2	.2	.3	3.3	7.0	1.5	8.4	(D)	.2	6.6
Pennsylvania	E2	49	4	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Tennessee	-	6	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Texas	E4	30	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Wisconsin	E1	64	11	.9	27.4	.7	1.5	21.6	45.8	10.1	53.6	3.3	CC	(D)

See footnotes at end of table.

Table 2. Industry Statistics for Selected States: 1987 and 1982—Con.

[Excludes data for auxiliaries. States with 150 employees or more are shown. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1987											1982	
	All establishments		All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees <sup>2</sup> (1,000)	Value added by manufacture (million dollars)
	E1	Total (no.)	With 20 employees or more (no.)	Number <sup>2</sup> (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)						
<b>INDUSTRY 3544, SPECIAL DIES, TOOLS, JIGS, AND FIXTURES</b>													
United States	E1	7 317	1 517	114.4	3 163.6	87.7	185.5	2 251.2	5 293.8	2 227.0	7 550.1	375.3	102.9
Alabama	E1	47	15	1.0	21.2	.8	1.7	15.3	34.1	17.7	51.7	(D)	CC
Arizona	E2	63	14	.8	17.5	.6	1.3	13.4	29.1	9.7	38.7	(D)	.5
Arkansas	E2	58	5	.5	9.5	.3	.7	7.0	18.3	6.5	24.7	1.2	.3
California	E2	639	91	7.5	199.8	5.7	11.9	139.2	353.2	150.5	502.1	18.6	6.8
Colorado	E1	46	5	.5	12.9	.4	.7	9.2	18.8	9.6	27.8	.6	.3
Connecticut	E2	264	36	3.0	80.1	2.2	4.6	55.1	134.8	47.7	182.6	7.3	2.9
Florida	E3	163	15	1.5	34.8	1.1	2.4	25.4	61.5	22.6	83.8	2.9	1.5
Georgia	-	63	10	1.0	21.5	.8	1.7	15.2	34.4	25.6	60.3	1.8	1.6
Illinois	E2	734	147	10.5	307.4	8.2	17.4	223.1	505.2	215.0	715.8	30.0	9.1
Indiana	E1	384	101	6.7	178.8	5.2	11.1	130.1	300.3	103.9	398.6	18.4	5.8
Iowa	E1	41	15	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.6
Kansas	E1	33	7	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	10.2
Kentucky	E2	66	13	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	20.3
Maine	-	10	4	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	10.9
Maryland	E3	23	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	7.1
Massachusetts	E2	244	45	2.9	75.3	2.2	4.7	55.0	119.6	45.4	163.6	7.8	3.6
Michigan	-	1 237	355	27.6	889.3	20.6	44.9	605.9	1 480.9	665.7	2 162.9	128.7	23.8
Minnesota	E1	145	25	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	62.4
Mississippi	E3	27	6	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	8.8
Missouri	E1	142	29	2.2	56.5	1.6	3.2	39.3	92.9	46.6	137.9	5.9	1.8
New Hampshire	E2	37	4	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.3
New Jersey	E2	292	51	4.0	103.8	3.1	6.4	76.3	178.5	64.8	244.5	10.2	3.9
New York	E2	405	67	4.8	111.8	3.7	7.5	80.9	147.5	75.2	260.3	14.4	5.0
North Carolina	E1	85	12	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.7
Ohio	E1	773	198	14.7	391.5	11.5	24.6	288.4	692.4	280.4	966.0	45.2	13.7
Oklahoma	E3	24	4	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.6
Oregon	E3	44	2	.3	7.8	.2	.5	5.6	11.6	4.8	16.3	.5	10.5
Pennsylvania	-	413	103	8.5	226.3	6.6	13.6	164.1	383.4	162.3	545.3	30.4	8.2
Rhode Island	E3	51	5	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	12.6
South Carolina	E2	52	10	.6	12.5	.5	.9	8.5	22.9	12.0	35.1	1.3	.4
Tennessee	E1	122	23	1.5	36.4	1.1	2.2	24.3	55.3	25.3	80.4	(D)	1.2
Texas	E3	142	22	1.5	33.1	1.2	2.7	25.2	57.3	23.5	80.9	2.8	1.4
Virginia	E2	25	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	5.4
Washington	E1	47	5	.3	8.8	.3	.5	6.5	14.6	5.8	20.1	1.3	.2
Wisconsin	E1	302	61	4.6	141.0	3.7	7.8	103.4	226.7	84.1	310.2	16.2	3.9
<b>INDUSTRY 3545, MACHINE TOOL ACCESSORIES</b>													
United States	E1	1 879	564	48.4	1 184.4	35.0	71.0	756.8	2 560.8	1 038.1	3 594.8	113.2	55.1
Alabama	E2	12	4	.4	7.0	.3	.6	4.8	24.3	7.4	31.4	(D)	(D)
Arizona	E2	16	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Arkansas	E2	14	4	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	29.1
California	E3	215	34	2.5	56.4	1.9	3.6	36.9	112.1	47.2	159.3	3.6	2.4
Connecticut	E1	98	27	1.9	47.7	1.3	2.8	28.2	88.4	37.1	123.6	(D)	83.7
Florida	E3	35	10	.6	12.9	.5	.9	8.2	24.7	10.1	35.0	1.6	.8
Georgia	E1	16	4	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	25.9
Illinois	E1	125	40	3.8	91.0	2.8	5.7	59.9	181.6	76.9	261.5	7.1	4.9
Indiana	E2	58	16	1.2	26.0	.9	2.0	18.4	54.2	17.8	72.1	1.9	36.1
Iowa	-	16	5	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	9.3
Kentucky	E2	11	5	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)
Massachusetts	E1	77	33	3.7	88.8	2.6	5.3	56.5	165.1	64.3	231.8	7.2	5.4
Michigan	E1	424	152	9.3	256.0	6.5	13.6	163.4	530.8	220.6	747.8	21.0	11.6
Minnesota	E2	29	8	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	19.1
Missouri	-	17	2	.5	11.3	.3	.5	6.7	23.3	8.9	31.8	.2	EE
New Hampshire	E9	16	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
New Jersey	E1	62	15	1.2	28.1	.9	1.8	18.1	68.4	45.5	112.8	1.7	1.2
New York	E1	107	29	2.2	53.5	1.5	3.0	28.4	104.0	56.3	161.2	8.9	2.4
North Carolina	E1	28	9	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	34.1
Ohio	E1	172	62	6.7	171.1	4.6	9.1	101.2	399.6	134.2	538.0	18.2	7.7
Pennsylvania	E1	79	25	2.8	69.9	2.0	4.1	45.7	135.0	45.3	180.0	(D)	2.1
Rhode Island	-	23	8	1.2	32.6	.9	1.8	20.9	63.3	21.9	82.3	5.0	1.3
South Carolina	-	22	18	1.5	31.5	1.2	2.6	23.2	101.5	48.4	148.1	2.7	57.3
Tennessee	-	20	8	.9	21.5	.7	1.4	15.7	69.5	19.9	84.0	(D)	.8
Texas	E1	42	10	.6	13.8	.5	.9	9.8	33.1	14.2	48.6	(D)	.8
Utah	-	4	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Vermont	-	13	5	.7	15.4	.6	1.2	11.9	33.8	9.9	44.1	1.5	25.9
Virginia	-	9	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	20.3
Wisconsin	E1	43	14	1.5	36.1	1.1	2.3	23.4	81.0	43.0	125.3	4.6	51.0

See footnotes at end of table.

Table 2. Industry Statistics for Selected States: 1987 and 1982—Con.

[Excludes data for auxiliaries. States with 150 employees or more are shown. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1987											1982		
	All establishments		All employees		Production workers			Value added by manufacture	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees <sup>2</sup> (1,000)	Value added by manufacture (million dollars)	
	E1	Total (no.)	With 20 employees or more (no.)	Number <sup>2</sup> (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)							
<b>INDUSTRY 3546, POWER-DRIVEN HANDTOOLS</b>														
United States	-	199	68	16.8	382.8	11.7	22.3	222.3	1 125.0	1 045.9	2 161.8	46.2	21.6	940.3
Arizona	-	4	2	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Arkansas	-	4	3	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
California	E5	25	5	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.6	14.2
Illinois	E1	14	2	.3	5.4	.2	.3	2.8	8.4	10.8	21.1	.7	1.1	41.3
Indiana	-	7	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Iowa	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Maryland	-	2	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Massachusetts	E1	6	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Mississippi	-	1	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
New York	-	11	4	1.0	26.6	.7	1.4	17.5	70.4	61.1	119.2	2.6	EE	(D)
North Carolina	-	11	7	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	3.4	155.3
Ohio	E1	19	10	1.6	45.0	.9	1.9	23.6	92.4	50.8	143.6	3.2	2.0	64.3
Oregon	-	4	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Pennsylvania	-	8	2	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
South Carolina	-	4	4	2.1	47.3	1.5	2.8	25.6	107.2	113.9	225.9	5.9	EE	(D)
Tennessee	-	3	2	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Texas	E1	9	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.7	28.1
Virginia	-	1	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Wisconsin	-	3	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
<b>INDUSTRY 3547, ROLLING MILL MACHINERY</b>														
United States	-	86	34	3.9	120.7	2.2	4.7	57.4	284.9	249.7	467.8	7.1	5.1	276.4
Illinois	-	7	4	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Indiana	-	3	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Massachusetts	-	5	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Ohio	-	15	9	1.2	38.3	.7	1.4	18.8	72.9	66.3	138.2	1.4	1.4	76.5
Pennsylvania	-	8	6	.8	27.0	.4	.8	9.5	109.6	84.3	131.7	2.1	1.9	118.8
<b>INDUSTRY 3548, WELDING APPARATUS</b>														
United States	-	225	130	18.7	541.5	11.5	24.2	292.9	1 084.4	1 062.1	2 104.6	45.4	(NA)	(NA)
California	E1	24	12	1.0	26.8	.6	1.2	13.8	64.6	48.4	110.7	1.7	(NA)	(NA)
Colorado	-	2	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Florida	E9	6	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Georgia	E1	4	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Illinois	-	11	10	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Indiana	-	6	3	.2	6.8	.1	.2	1.8	.6	15.9	23.3	.5	(NA)	(NA)
Kansas	-	3	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Massachusetts	E3	3	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Michigan	E1	48	34	2.8	96.5	2.0	4.6	58.8	129.9	227.7	344.9	5.2	(NA)	(NA)
Minnesota	-	4	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Missouri	E4	9	6	.7	12.8	.5	.9	8.2	28.2	26.8	55.5	.9	(NA)	(NA)
New Hampshire	-	3	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
New Jersey	E1	6	5	.2	5.3	.1	.2	2.6	10.5	9.2	19.8	.2	(NA)	(NA)
New York	-	10	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
North Carolina	-	4	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Ohio	-	21	13	4.6	161.0	3.1	6.6	97.1	283.6	332.7	593.7	14.0	(NA)	(NA)
Pennsylvania	-	15	8	1.1	29.1	.7	1.3	15.8	90.4	52.5	141.6	3.3	(NA)	(NA)
South Carolina	-	3	2	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
South Dakota	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Texas	-	8	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Wisconsin	-	9	4	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
<b>INDUSTRY 3549, METALWORKING MACHINERY, N.E.C.</b>														
United States	E1	302	147	11.5	338.8	7.0	14.7	181.9	593.3	451.6	1 055.0	21.4	(NA)	(NA)
California	E5	25	9	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Connecticut	E1	14	6	.5	15.4	.3	.8	9.2	31.0	14.8	45.3	(D)	(NA)	(NA)
Illinois	-	32	15	1.6	43.8	1.0	1.9	22.5	79.7	52.9	136.4	5.3	(NA)	(NA)
Indiana	E3	12	8	.4	13.3	.3	.6	7.3	19.6	17.6	35.5	1.0	(NA)	(NA)
Massachusetts	-	12	5	.4	8.1	.2	.6	4.5	15.8	11.1	27.1	(D)	(NA)	(NA)
Michigan	E1	51	29	2.4	82.2	1.5	3.3	43.7	128.1	140.1	266.0	(D)	(NA)	(NA)
Minnesota	-	6	4	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
New Jersey	E3	15	9	.4	11.9	.2	.5	6.1	20.8	14.3	34.4	.3	(NA)	(NA)
New York	E2	15	12	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Ohio	E1	28	14	.9	25.6	.6	1.2	14.2	48.1	36.5	82.3	(D)	(NA)	(NA)
Oklahoma	-	3	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Pennsylvania	E2	21	10	.8	21.2	.5	.9	11.1	39.1	32.0	70.8	(D)	(NA)	(NA)
Texas	-	7	4	.4	9.2	.2	.5	5.4	8.0	16.7	35.7	.6	(NA)	(NA)
Wisconsin	-	16	8	1.2	37.3	.8	1.4	20.8	67.1	27.9	99.6	1.5	(NA)	(NA)

See footnotes at end of table.

Table 2. Industry Statistics for Selected States: 1987 and 1982—Con.

Note: For qualifications of data, see footnotes on table 1a-1.

<sup>1</sup>Payroll and sales data for some small single-unit companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other Government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at the time data were tabulated. The following symbols are shown for those States where estimated value of shipments data based on administrative-record data account for 10 percent or more of figure shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.

<sup>2</sup>Statistics for some producing States have been withheld to avoid disclosing data for individual companies. However, for States with 150 employees or more, number of establishments is shown and employment-size range is indicated by one of the following symbols: AA—150 to 249 employees; BB—250 to 499 employees; CC—500 to 999 employees; EE—1,000 to 2,499 employees; FF—2,500 employees or more.

Table 3a. Summary Statistics for the Industry: 1987

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Machine tools, metal cutting types (SIC 3541)	Machine tools, metal forming types (SIC 3542)	Industrial patterns (SIC 3543)	Special dies, tools, jigs, and fixtures (SIC 3544)	Machine tool accessories (SIC 3545)	Power-driven handtools (SIC 3546)	Rolling mill machinery (SIC 3547)	Welding apparatus (SIC 3548)	Metalworking machinery, n.e.c. (SIC 3549)
Companies number	381	196	812	7 207	1 734	183	83	203	293
All establishments do	417	207	813	7 317	1 879	199	86	225	302
With 1 to 19 employees do	185	87	728	5 800	1 315	131	52	95	155
With 20 to 99 employees do	169	87	77	1 397	468	34	25	84	124
With 100 employees or more do	63	33	8	120	96	34	9	46	23
Employment and labor costs:									
Employees 1,000	31.7	13.8	8.6	114.4	48.4	16.8	3.9	18.7	11.5
Compensation, total mil dol	1 142.1	513.9	284.8	3 831.2	1 460.3	481.2	148.2	648.2	409.6
Annual payroll do	921.5	414.3	237.5	3 163.6	1 184.4	382.8	120.7	541.5	338.8
Fringe benefits do	220.6	99.6	47.3	667.6	275.9	98.3	27.4	106.7	70.7
Social Security and other legally required payments do	88.7	38.7	15.2	293.5	113.8	37.0	12.2	48.4	30.3
Employer payments and other programs do	131.9	60.9	32.1	374.1	162.0	61.3	15.2	58.4	40.4
Production workers:									
Average for year 1,000	18.2	8.7	6.9	87.7	35.0	11.7	2.2	11.5	7.0
March do	18.5	8.7	6.7	87.5	34.6	11.3	2.2	11.2	7.0
May do	18.3	8.6	6.8	87.3	34.8	11.5	2.3	11.4	6.9
August do	18.0	8.6	6.9	87.2	35.0	11.8	2.3	11.7	7.0
November do	17.7	8.7	7.1	87.4	34.9	11.9	2.2	11.7	7.0
Hours millions	35.4	18.1	13.8	185.5	71.0	22.3	4.7	24.2	14.7
January to March do	9.1	4.5	3.3	46.5	17.5	5.4	1.1	5.9	3.7
April to June do	8.9	4.5	3.4	46.1	17.9	5.7	1.2	6.0	3.6
July to September do	8.7	4.4	3.5	46.1	17.6	5.4	1.2	6.1	3.7
October to December do	8.7	4.7	3.6	46.8	18.0	5.7	1.2	6.2	3.7
Wages mil dol	465.7	236.7	186.4	2 251.2	756.8	222.3	57.4	292.9	181.9
Value added by manufacture do	1 668.7	734.3	389.3	5 293.8	2 560.8	1 125.0	284.9	1 084.4	593.3
Cost of materials <sup>1</sup> do	1 399.5	637.8	112.5	2 227.0	1 038.1	1 045.9	249.7	1 062.1	451.6
Materials, parts, containers, etc., consumed <sup>2</sup> do	1 151.4	542.9	91.4	1 638.1	800.6	846.6	192.8	899.8	394.7
Resales do	150.0	52.5	1.8	71.4	99.6	166.2	20.8	77.1	8.2
Fuels do	9.6	4.3	2.7	29.2	10.5	3.2	2.5	7.9	3.0
Purchased electricity do	34.5	12.4	5.4	84.6	56.3	18.6	5.4	20.7	8.7
Contract work do	54.1	25.7	11.2	403.8	71.1	11.3	28.1	56.6	37.0
Quantity of electric energy used for heat and power:									
Purchased mil kWh do	565.2	234.5	104.2	1 397.7	979.1	328.1	89.5	348.4	147.2
Generated less sold (S) do	-	-	-	1.3	(D)	-	-	-	-
Total value of shipments mil dol	3 189.5	1 396.3	499.4	7 550.1	3 594.8	2 161.8	467.8	2 104.6	1 055.0
Primary products do	2 394.1	1 186.1	445.0	6 678.0	3 162.9	1 609.5	378.0	1 772.3	898.8
Secondary products do	484.8	116.7	36.5	418.8	211.2	335.6	32.3	200.1	112.7
Miscellaneous receipts, total do	310.6	93.5	17.9	453.2	220.8	216.6	57.5	132.2	43.6
Value of resales do	206.7	70.3	2.2	115.6	144.0	211.4	26.3	110.7	11.8
Contract receipts do	37.2	8.4	11.6	237.2	51.9	3.3	22.5	5.7	16.2
Sales of scrap and refuse do	.2	.4	(X)	4.9	1.0	(D)	(D)	(X)	(D)
Receipts for installation or construction of products of the establishment do	(D)	1.2	(X)	(X)	(X)	(X)	-	(X)	.3
Receipts for research and development work do	4.0	(D)	(X)	5.8	.9	(X)	-	-	(D)
Receipts for repair work do	40.9	3.8	(X)	35.1	17.3	(D)	(D)	5.6	6.4
Other miscellaneous receipts do	(D)	(D)	(X)	28.5	4.5	(D)	4.7	9.3	8.0
Miscellaneous receipts, n.s.k. do	.7	2.4	4.1	26.1	1.2	.1	(Z)	.9	.3
Inventories by stage of fabrication:									
Beginning of 1987 mil dol	1 180.0	564.1	39.9	1 001.8	803.1	346.6	103.9	507.8	280.5
Finished goods do	268.5	130.5	7.5	130.9	339.1	154.4	14.2	142.6	54.4
Work in process do	681.6	343.1	25.2	656.5	289.8	112.1	74.3	210.0	158.7
Materials and supplies do	229.9	90.5	7.1	214.4	174.3	80.1	15.4	155.3	67.4
End of 1987 do	1 056.8	529.3	43.0	952.1	812.1	361.2	170.6	556.4	265.8
Finished goods do	235.5	128.6	5.9	126.8	342.1	175.9	13.7	165.6	53.6
Work in process do	593.3	320.8	29.3	631.3	290.8	99.8	141.5	228.8	149.4
Materials and supplies do	227.9	80.0	7.9	194.0	179.2	85.5	15.4	161.9	62.8
Primary product specialization ratio percent do	83	91	92	94	94	83	92	90	89
Coverage ratio do	93	87	80	82	93	85	94	92	88

Note: For qualifications of data, see footnotes on table 1a-1.

<sup>1</sup>Data on purchased services for the repair of buildings and machinery and for communication services are not included in cost of materials, etc., but are shown in table 3c.

<sup>2</sup>Data on materials consumed by type are shown in table 7. Data on amount purchased or transferred from foreign sources are shown in table 3c.

**Table 3b. Gross Book Value of Depreciable Assets, Capital Expenditures, Retirements, Depreciation, and Rental Payments: 1987**

[Million dollars. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Machine tools, metal cutting types (SIC 3541)	Machine tools, metal forming types (SIC 3542)	Industrial patterns (SIC 3543)	Special dies, tools, jigs, and fixtures (SIC 3544)	Machine tool accessories (SIC 3545)	Power-driven handtools (SIC 3546)	Rolling mill machinery (SIC 3547)	Welding apparatus (SIC 3548)	Metalworking machinery, n.e.c. (SIC 3549)
<b>Gross book value of depreciable assets:</b>									
Total:									
Beginning of year	1 419.3	576.3	184.2	3 434.9	1 600.3	651.4	204.8	602.4	302.4
New capital expenditures <sup>1</sup>	61.1	31.2	18.5	375.3	113.2	46.2	7.1	45.4	21.4
Used capital expenditures	5.6	3.3	4.1	79.8	19.8	3.0	1.0	8.6	8.5
Retirements	79.1	16.4	4.2	43.1	162.7	52.9	17.4	14.6	6.8
End of year	1 407.1	594.5	202.6	3 846.9	1 570.6	647.7	195.5	641.7	325.4
<b>Buildings and other structures:</b>									
Beginning of year	389.4	152.9	24.9	590.4	359.7	126.8	50.0	201.7	99.7
New capital expenditures	12.2	2.4	3.4	64.2	14.5	2.5	1.6	10.7	5.2
Used capital expenditures	1.7	1.2	1.7	23.4	5.1	.5	.2	.9	.5
Retirements	4.1	.7	.3	9.2	25.9	15.9	4.5	.3	.7
End of year	399.3	155.8	29.7	668.7	353.4	113.8	47.3	213.0	104.8
<b>Machinery and equipment:</b>									
Beginning of year	1 030.0	423.4	159.3	2 844.5	1 240.6	524.6	154.8	400.7	202.6
New capital expenditures <sup>1</sup>	49.0	28.8	15.1	311.1	98.7	43.7	5.5	34.7	16.1
Used capital expenditures	3.9	2.2	2.5	56.4	14.7	2.5	.8	7.7	8.0
Retirements	75.0	15.7	3.9	33.9	136.7	36.9	12.9	14.3	6.1
End of year	1 007.8	438.7	172.9	3 178.2	1 217.2	533.9	148.2	428.7	220.6
<b>Depreciation charges during 1987:</b>									
Total	85.7	34.6	17.9	308.6	130.0	53.3	10.8	41.0	23.8
Buildings and other structures	14.7	5.2	1.7	30.0	17.0	4.3	1.5	8.4	4.4
Machinery and equipment	70.9	29.4	16.2	278.6	113.0	49.0	9.3	32.6	19.4
<b>Rental payments:</b>									
Total	25.2	10.2	7.9	122.2	38.1	7.4	3.5	16.1	12.0
Buildings and other structures	8.0	4.6	3.6	56.8	13.8	1.9	1.1	9.1	5.8
Machinery and equipment	17.2	5.6	4.3	65.4	24.3	5.4	2.4	7.0	6.2

Note: Retirements and depreciation data for establishments not included in the ASM sample were extrapolated from the historical ratio of retirements or depreciation to assets. These ratios were developed at the industry level.

<sup>1</sup>Data on new machinery and equipment expenditures by type are provided in table 3c.

**Table 3c. Supplemental Industry Statistics Based on Sample Estimates: 1987**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Machine tools, metal cutting types (SIC 3541)		Machine tools, metal forming types (SIC 3542)		Industrial patterns (SIC 3543)		Special dies, tools, jigs, and fixtures (SIC 3544)		
	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	
<b>Purchased services:</b>									
Cost of purchased services for the repair of-									
Buildings and other structures	4.7	(X)	2.9	(X)	1.0	(X)	16.7	(X)	
Response coverage ratio (percent) <sup>2</sup>	70.9	(X)	74.9	(X)	54.8	(X)	50.0	(X)	
Machinery	10.8	(X)	9.3	(X)	2.8	(X)	40.1	(X)	
Response coverage ratio (percent) <sup>2</sup>	70.9	(X)	79.5	(X)	54.8	(X)	52.7	(X)	
Cost of purchased communication services	11.7	(X)	5.3	(X)	(S)	(X)	12.8	(X)	
Response coverage ratio (percent) <sup>2</sup>	72.9	(X)	82.6	(X)	(S)	(X)	51.9	(X)	
New machinery and equipment expenditures	49.0	(X)	28.8	(X)	15.1	(X)	311.1	(X)	
Automobiles, trucks, etc., for highway use	1.3	11	1.2	36	2.1	70	14.2	17	
Computers and peripheral data processing equipment	8.4	9	5.3	26	2.6	66	28.0	15	
All other	39.2	3	22.3	7	10.5	18	268.9	3	
Adjustment ratio <sup>3</sup>	1.1	(X)	1.1	(X)	1.4	(X)	1.4	(X)	
Cost of materials, components, parts, etc., used	1 151.4	(X)	542.9	(X)	91.4	(X)	1 638.1	(X)	
Materials purchased or transferred from foreign sources <sup>4</sup>	125.6	6	41.6	40	(S)	1	22.4	12	
Materials purchased or transferred from domestic sources	1 025.9	1	501.3	4	(S)	1	1 615.7	1	
Adjustment ratio <sup>3</sup>	1.5	(X)	1.5	(X)	(S)	(X)	1.7	(X)	
Item	Machine tool accessories (SIC 3545)		Power-driven handtools (SIC 3546)		Rolling mill machinery (SIC 3547)		Welding apparatus (SIC 3548)		Metalworking machinery, n.e.c. (SIC 3549)
	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	
<b>Purchased services:</b>									
Cost of purchased services for the repair of-									
Buildings and other structures	5.1	(X)	1.6	(X)	.7	(X)	2.3	(X)	1.5
Response coverage ratio (percent) <sup>2</sup>	63.4	(X)	76.8	(X)	66.7	(X)	52.6	(X)	53.7
Machinery	17.0	(X)	5.9	(X)	2.3	(X)	5.9	(X)	2.2
Response coverage ratio (percent) <sup>2</sup>	68.3	(X)	82.3	(X)	68.1	(X)	57.6	(X)	52.5
Cost of purchased communication services	9.0	(X)	4.8	(X)	1.4	(X)	6.1	(X)	3.0
Response coverage ratio (percent) <sup>2</sup>	66.5	(X)	75.3	(X)	74.6	(X)	58.2	(X)	51.0
New machinery and equipment expenditures	98.7	(X)	43.7	(X)	5.5	(X)	34.7	(X)	16.1
Automobiles, trucks, etc., for highway use	3.7	13	.2	4	.1	11	1.5	8	1.3
Computers and peripheral data processing equipment	8.2	13	2.3	14	1.8	10	5.0	5	4.0
All other	86.8	2	41.2	1	3.6	6	28.1	1	10.9
Adjustment ratio <sup>3</sup>	1.4	(X)	1.1	(X)	1.2	(X)	1.3	(X)	1.9

See footnotes at end of table.

Table 3c. Supplemental Industry Statistics Based on Sample Estimates: 1987—Con.

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Machine tool accessories (SIC 3545)		Power-driven handtools (SIC 3546)		Rolling mill machinery (SIC 3547)		Welding apparatus (SIC 3548)		Metalworking machinery, n.e.c. (SIC 3549)	
	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)
Cost of materials, components, parts, etc., used	800.6	(X)	846.6	(X)	192.8	(X)	899.8	(X)	394.7	(X)
Materials purchased or transferred from foreign sources <sup>4</sup>	63.5	21	136.4	4	6.6	4	173.9	4	16.6	14
Materials purchased or transferred from domestic sources	737.1	3	710.2	1	186.2	1	725.8	1	378.1	1
Adjustment ratio <sup>3</sup>	1.2	(X)	1.2	(X)	1.5	(X)	1.4	(X)	1.8	(X)

<sup>1</sup>For description of relative standard error of estimate, see Qualifications of the Data in appendixes.

<sup>2</sup>Measure of extent to which respondents reported each item. Derived for each item by calculating the ratio of weighted employment for those sample establishments that reported the specific inquiry to total employment for all establishments classified in industry. (See appendixes for explanation of sample weight.)

<sup>3</sup>Detail has been adjusted upwards to account for nonresponse. Inverse of the ratio shown represents a measure of the response to the inquiry. (See appendixes for further explanation.)

<sup>4</sup>Data may underestimate the true cost of imported parts, components, and supplies since some respondents do not know the origin of these materials. Includes cases where materials were purchased from secondary suppliers or where they were transferred from company-operated warehouses or other distribution points. Direct purchases from foreign suppliers and importers by domestic manufacturing establishments are believed to be reported accurately.

Table 4. Industry Statistics by Employment Size of Establishment: 1987

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	All estab- lish- ments (no.)	All employees		Production workers			Value added by manufac- ture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expend- itures (million dollars)	End-of- year inven- tories (million dollars)	
		E1	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)						
<b>INDUSTRY 3541, MACHINE TOOLS, METAL CUTTING TYPES</b>												
Total	417	31.7	921.5	18.2	35.4	465.7	1 668.7	1 399.5	3 189.5	61.1	1 056.8	
Establishments with an average of—												
1 to 4 employees	E2	22	.1	1.5	(Z)	.1	.8	(S)	7.3	6.0	.1	1.1
5 to 9 employees	E2	52	.4	9.7	2	5	6.1	14.8	12.6	27.3	.7	6.8
10 to 19 employees	E2	111	1.5	38.5	1.0	2.0	23.3	67.0	51.1	118.0	2.7	29.3
20 to 49 employees	E1	111	3.4	92.5	2.1	4.4	51.4	223.0	213.2	450.4	7.6	98.9
50 to 99 employees	E1	58	3.8	109.8	2.2	4.7	55.4	173.5	181.5	367.5	8.0	119.1
100 to 249 employees	—	36	5.7	167.3	3.3	6.8	83.7	287.8	286.6	594.4	14.3	201.8
250 to 499 employees	—	17	6.0	182.9	3.2	6.4	82.8	320.3	302.3	669.1	4.6	275.1
500 to 999 employees	—	6	4.2	118.7	2.5	4.8	64.4	227.5	135.7	363.3	9.8	167.8
1,000 to 2,499 employees	—	3	6.6	200.5	3.4	5.8	97.6	360.9	209.2	593.6	13.3	156.9
2,500 employees or more	—	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
<b>INDUSTRY 3542, MACHINE TOOLS, METAL FORMING TYPES</b>												
Total	207	13.8	414.3	8.7	18.1	236.7	734.3	637.8	1 396.3	31.2	529.3	
Establishments with an average of—												
1 to 4 employees	E5	5	(Z)	.3	(Z)	.3	.5	.3	.8	(Z)	.2	
5 to 9 employees	E1	19	.1	3.8	.1	.2	2.6	6.1	4.2	10.2	.1	2.8
10 to 19 employees	E3	63	.9	22.9	.6	1.2	14.1	40.2	29.9	72.0	1.7	17.3
20 to 49 employees	E2	49	1.6	41.8	1.0	2.1	24.6	76.0	58.6	135.6	2.3	37.3
50 to 99 employees	E1	38	2.9	82.1	1.8	3.8	45.8	163.0	172.9	327.6	9.8	118.0
100 to 249 employees	E1	22	3.2	101.1	2.0	4.5	58.9	189.9	208.7	399.3	6.0	109.1
250 to 499 employees	—	8	3.0	94.6	1.8	3.8	52.5	116.3	98.8	259.0	6.1	167.3
500 to 999 employees	—	3	2.1	67.8	1.2	2.5	38.0	142.4	64.4	191.8	5.2	77.3
<b>INDUSTRY 3543, INDUSTRIAL PATTERNS</b>												
Total	813	8.6	237.5	6.9	13.8	186.4	389.3	112.5	499.4	18.5	43.0	
Establishments with an average of—												
1 to 4 employees	E8	311	.7	15.4	.5	1.1	12.2	26.8	10.0	36.8	.9	1.9
5 to 9 employees	E3	251	1.7	40.9	1.4	2.8	33.1	68.4	20.4	89.1	3.2	4.4
10 to 19 employees	E1	166	2.2	60.2	1.8	3.5	46.8	95.9	27.5	122.9	3.3	8.7
20 to 49 employees	E1	67	1.8	51.2	1.4	3.0	40.9	75.4	28.2	105.0	4.1	10.0
50 to 99 employees	—	10	.7	25.8	.5	1.1	20.3	43.3	9.4	52.1	1.7	6.3
100 to 249 employees	—	6	1.5	43.9	1.1	2.3	33.1	79.5	17.1	93.6	5.3	11.8
250 to 499 employees	—	2	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records <sup>2</sup>	E9	358	1.1	20.7	.9	1.7	16.3	36.7	13.6	50.3	1.4	2.6

See footnotes at end of table.

Table 4. Industry Statistics by Employment Size of Establishment: 1987—Con.

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	All establish- ments (no.)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expendi- tures (million dollars)	End-of- year inven- tories (million dollars)	
		Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						
<b>INDUSTRY 3544, SPECIAL DIES, TOOLS, JIGS, AND FIXTURES</b>												
Total	E1	7 317	114.4	3 163.6	87.7	185.5	2 251.2	5 293.8	2 227.0	7 550.1	375.3	952.1
Establishments with an average of—												
1 to 4 employees	E8	2 430	5.3	110.2	4.3	8.3	79.1	199.5	71.0	270.3	8.1	31.7
5 to 9 employees	E3	1 747	11.8	265.6	9.1	19.0	198.1	449.7	169.2	616.6	29.7	68.7
10 to 19 employees	E1	1 623	22.2	556.4	17.1	34.8	413.0	926.0	367.1	1 290.1	62.4	127.8
20 to 49 employees	E1	1 106	33.0	917.3	25.3	54.6	658.8	1 474.7	619.9	2 136.2	91.6	256.7
50 to 99 employees	E1	291	19.6	609.2	15.0	33.0	430.6	1 082.0	424.9	1 491.1	71.6	210.6
100 to 249 employees	E1	105	15.0	425.8	11.4	24.7	292.9	750.6	384.7	1 130.7	53.9	186.6
250 to 499 employees	—	12	7.5	279.0	5.6	11.2	178.8	411.3	190.0	615.2	58.1	69.9
500 to 999 employees	—	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
1,000 to 2,499 employees	—	2	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records <sup>2</sup>	E9	2 929	9.7	167.8	7.8	15.4	119.2	301.0	106.9	408.0	12.0	47.8
<b>INDUSTRY 3545, MACHINE TOOL ACCESSORIES</b>												
Total	E1	1 879	48.4	1 184.4	35.0	71.0	756.8	2 560.8	1 038.1	3 594.8	113.2	812.1
Establishments with an average of—												
1 to 4 employees	E9	592	1.3	24.9	.9	1.8	16.1	54.4	18.8	74.1	1.5	14.9
5 to 9 employees	E7	405	2.7	53.0	2.0	3.9	34.6	110.6	39.8	150.8	3.2	30.9
10 to 19 employees	E3	318	4.4	93.2	3.1	6.2	59.6	183.2	71.6	257.4	6.5	44.4
20 to 49 employees	E2	333	10.2	252.2	7.5	15.5	165.5	555.6	213.5	767.6	20.0	130.4
50 to 99 employees	E2	135	9.2	223.8	6.7	13.5	140.0	488.9	228.2	712.2	19.5	167.1
100 to 249 employees	E1	70	10.1	254.3	7.3	14.8	163.7	542.2	236.9	767.0	25.8	184.1
250 to 499 employees	—	22	7.8	205.0	5.4	11.1	123.6	476.5	159.2	646.7	24.2	149.7
500 to 999 employees	—	3	2.9	78.1	2.1	4.3	53.8	149.6	70.1	219.1	12.5	90.6
1,000 to 2,499 employees	—	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records <sup>2</sup>	E9	909	3.9	64.5	2.8	5.3	41.9	140.6	47.9	188.5	3.9	38.2
<b>INDUSTRY 3546, POWER-DRIVEN HANDTOOLS</b>												
Total	—	199	16.8	382.8	11.7	22.3	222.3	1 125.0	1 045.9	2 161.8	46.2	361.2
Establishments with an average of—												
1 to 4 employees	E9	65	.1	2.2	.1	.2	1.3	5.8	5.3	11.1	.3	2.0
5 to 9 employees	E8	35	.2	5.0	.2	.3	3.1	14.3	11.5	25.8	.7	4.1
10 to 19 employees	E7	31	.4	9.5	.3	.6	5.4	22.2	18.6	40.9	1.2	7.2
20 to 49 employees	E4	22	.7	15.5	.5	.9	8.5	33.9	34.0	67.5	1.9	13.1
50 to 99 employees	E1	12	.8	15.4	.6	1.1	9.8	31.4	27.9	60.1	.8	12.6
100 to 249 employees	—	14	2.3	59.1	1.5	3.3	32.1	138.1	73.0	216.7	8.2	68.3
250 to 499 employees	—	9	3.1	84.6	2.3	4.4	49.6	198.8	257.9	455.7	8.1	61.5
500 to 999 employees	—	9	9.1	191.6	6.3	11.6	112.4	680.5	617.7	1 284.1	25.0	192.4
1,000 to 2,499 employees	—	2	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records <sup>2</sup>	E9	115	.7	13.4	.5	.9	8.3	35.8	31.8	67.6	1.9	11.5
<b>INDUSTRY 3547, ROLLING MILL MACHINERY</b>												
Total	—	86	3.9	120.7	2.2	4.7	57.4	284.9	249.7	467.8	7.1	170.6
Establishments with an average of—												
1 to 4 employees	E9	21	(Z)	1.0	(Z)	.1	.5	1.6	1.8	3.4	(Z)	.7
5 to 9 employees	E7	16	.1	2.6	.1	.2	1.5	3.9	4.1	8.2	.1	1.5
10 to 19 employees	E2	15	.2	4.4	.1	.3	2.5	7.3	8.2	15.6	.4	4.4
20 to 49 employees	E2	15	.5	12.7	.3	.6	6.1	22.4	19.0	39.9	.3	8.0
50 to 99 employees	—	10	.7	18.6	.4	1.0	11.3	42.4	43.2	90.6	.5	11.7
100 to 249 employees	—	5	.8	23.9	.6	1.1	15.0	41.6	33.0	70.0	2.9	16.7
250 to 499 employees	—	3	1.7	57.6	.7	1.6	20.5	165.6	140.5	240.0	2.8	127.5
500 to 999 employees	—	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records <sup>2</sup>	E9	32	.2	3.8	.1	.2	1.8	6.2	7.6	13.8	.2	3.2
<b>INDUSTRY 3548, WELDING APPARATUS</b>												
Total	—	225	18.7	541.5	11.5	24.2	292.9	1 084.4	1 062.1	2 104.6	45.4	556.4
Establishments with an average of—												
1 to 4 employees	E8	36	.1	1.5	.1	.1	.8	3.6	3.1	6.7	.1	1.5
5 to 9 employees	E7	22	.1	3.3	.1	.2	1.9	8.1	6.0	14.1	.2	2.3
10 to 19 employees	E6	37	.5	12.0	.3	.6	6.4	26.7	21.9	49.1	2.1	11.4
20 to 49 employees	E2	49	1.5	41.6	1.0	2.0	22.1	91.0	72.9	162.2	3.4	32.5
50 to 99 employees	E2	35	2.6	72.9	1.6	3.5	37.5	150.8	128.5	279.6	5.7	73.5
100 to 249 employees	—	29	4.5	123.1	2.6	5.7	68.4	198.0	289.2	477.5	7.3	189.9
250 to 499 employees	—	12	3.9	105.0	2.3	4.4	49.0	254.0	190.7	438.0	7.0	86.4
500 to 999 employees	—	3	5.5	182.1	3.6	7.7	106.9	352.2	349.9	677.4	19.6	158.8
1,000 to 2,499 employees	—	2	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records <sup>2</sup>	E9	72	.6	11.9	.4	.8	6.5	25.5	21.2	46.7	.7	9.2

See footnotes at end of table.

Table 4. Industry Statistics by Employment Size of Establishment: 1987—Con.

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	All establishments (no.) E1	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	End-of-year inventories (million dollars)
		Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
<b>INDUSTRY 3549, METALWORKING MACHINERY, N.E.C.</b>											
Total -----	E1	302	11.5	338.8	7.0	14.7	181.9	593.3	451.6	1 055.0	21.4
Establishments with an average of—											
1 to 4 employees -----	E8	54	.1	2.3	.1	.1	1.2	2.1	3.3	8.3	.2
5 to 9 employees -----	E8	41	.3	5.7	.2	.3	3.3	10.3	7.1	17.0	.4
10 to 19 employees -----	E3	60	.8	20.2	.5	1.1	12.0	34.7	24.4	62.3	.9
20 to 49 employees -----	E2	75	2.2	60.2	1.4	2.9	33.5	110.6	90.9	200.5	3.3
50 to 99 employees -----	E1	49	3.5	101.9	2.2	4.6	54.4	176.4	141.6	316.0	5.9
100 to 249 employees -----	-	17	2.5	79.4	1.7	3.5	48.1	129.5	107.0	245.6	4.5
250 to 499 employees -----	-	6	2.0	69.1	1.0	2.0	29.3	129.6	77.3	205.3	6.2
Covered by administrative records <sup>2</sup> -----	E9	90	.4	7.6	.3	.5	4.2	14.5	10.3	24.9	.5
Note: For qualifications of data, see footnotes on table 1a-1. Data shown as a (D) are included in underscored figures above.											
<sup>1</sup> Payroll and sales data for some small single unit companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other Government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at the time data were tabulated. The following symbols are shown for those employment-size classes where estimated data based on administrative-record data account for 10 percent or more of figures shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.											
<sup>2</sup> Report forms were not mailed to small single unit companies with up to 20 employees (cutoff varied by industry). Payroll and sales data for 1987 were obtained from administrative records supplied by other agencies of the Federal Government. Those data were then used in conjunction with industry averages to estimate the items shown. Data are also included in respective employment-size classes shown.											

Note: For qualifications of data, see footnotes on table 1a-1. Data shown as a (D) are included in underscored figures above.

<sup>1</sup>Payroll and sales data for some small single unit companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other Government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at the time data were tabulated. The following symbols are shown for those employment-size classes where estimated data based on administrative-record data account for 10 percent or more of figures shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.

<sup>2</sup>Report forms were not mailed to small single unit companies with up to 20 employees (cutoff varied by industry). Payroll and sales data for 1987 were obtained from administrative records supplied by other agencies of the Federal Government. Those data were then used in conjunction with industry averages to estimate the items shown. Data are also included in respective employment-size classes shown.

Table 5a. Industry Statistics by Industry and Primary Product Class Specialization: 1987

[Table presents selected statistics for establishments according to their degree of specialization in products primary to their industry. Measures of plant specialization shown are (1) industry specialization: ratio of primary product shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment; and (2) product class specialization: ratio of largest primary product class shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment. See appendix for method of computing ratios. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry or product class code	Industry or primary product class	All establishments (number)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)				
<b>3541 Machine tools, metal cutting types:</b>											
	All establishments in industry -----	417	31.7	921.5	18.2	35.4	465.7	1 668.7	1 399.5	3 189.5	61.1
Establishments with this product class primary:											
3541D	Boring machines and drilling machines -----	25	1.6	50.1	.9	2.1	26.7	81.7	68.8	162.7	1.4
35413	Gear cutting machines -----	5	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
35414	Grinding, polishing, buffing, honing, and lapping machines -----	63	5.6	163.4	3.1	6.6	80.8	276.5	202.7	499.7	9.5
35415	Lathes -----	20	3.4	96.1	2.0	3.7	47.0	185.2	167.0	347.0	7.7
35416	Milling machines -----	11	2.6	77.4	1.6	2.4	38.3	137.8	139.6	286.5	3.0
35418	Machine tools home workshops -----	23	1.2	32.4	.7	1.4	15.4	69.0	56.5	125.1	3.4
35419	Parts for metal cutting type machine tools -----	74	6.5	187.6	3.7	6.9	95.9	332.0	233.8	592.0	9.8
3541A	Machining centers -----	18	1.9	52.8	.9	1.9	24.6	122.8	137.7	261.1	2.8
3541B	Station type machines -----	16	3.0	101.6	1.8	3.4	53.3	199.2	191.7	440.6	6.7
3541C	Metal cutting machine tools, n.e.c. -----	61	2.5	70.3	1.5	3.1	35.8	116.6	128.2	244.1	6.9
<b>3542 Machine tools, metal forming types:</b>											
	All establishments in industry -----	207	13.8	414.3	8.7	18.1	236.7	734.3	637.8	1 396.3	31.2
Establishments with this product class primary:											
35421	Punching, shearing, bending, and forming machines -----	61	4.1	125.2	2.4	4.9	63.7	234.5	228.5	466.9	11.4
35422	Presses, except forging and die-stamping -----	38	4.3	130.2	2.8	5.8	74.5	195.9	181.1	402.4	4.3
35423	Other metal forming machine tools, n.e.c. -----	31	2.4	73.3	1.5	3.3	44.5	137.4	127.5	263.5	6.9
35424	Parts for metal forming machine tools -----	44	2.2	65.5	1.5	3.1	42.2	132.5	76.1	204.9	7.7
<b>3543 Industrial patterns:</b>											
	All establishments in industry -----	813	8.6	237.5	6.9	13.8	186.4	389.3	112.5	499.4	18.5
<b>3544 Special dies, tools, jigs, and fixtures:</b>											
	All establishments in industry -----	7 317	114.4	3 163.6	87.7	185.5	2 251.2	5 293.8	2 227.0	7 550.1	375.3
Establishments with this product class primary:											
35441	Special dies and tools, die sets, jigs, and fixtures -----	1 880	53.2	1 581.7	40.0	85.0	1 095.3	2 657.1	1 156.7	3 811.0	209.6
35442	Industrial molds and mold boxes -----	1 252	30.8	920.0	23.9	51.8	678.2	1 479.1	645.8	2 159.1	112.2
<b>3545 Machine tool accessories:</b>											
	All establishments in industry -----	1 879	48.4	1 184.4	35.0	71.0	756.8	2 560.8	1 038.1	3 594.8	113.2
Establishments with this product class primary:											
35451	Small cutting tools for machine tools and metalworking machinery -----	440	25.9	633.2	19.4	39.6	419.4	1 455.4	584.5	2 030.2	64.7
35454	Machine tool attachments and accessories, n.e.c. -----	134	6.3	169.7	4.3	8.9	105.7	342.1	142.7	486.2	12.0
35455	Precision measuring tools -----	88	6.0	173.4	3.8	7.9	94.1	318.3	152.1	474.9	22.6
<b>3546 Power-driven handtools:</b>											
	All establishments in industry -----	199	16.8	382.8	11.7	22.3	222.3	1 125.0	1 045.9	2 161.8	46.2
Establishments with this product class primary:											
35461	Power-driven handtools, electric (including battery-powered) -----	26	8.2	168.0	6.1	11.5	101.6	616.4	582.2	1 202.3	22.7
35462	Power-driven handtools, pneumatic, hydraulic, and powder-actuated -----	33	5.2	144.5	3.3	6.6	81.5	316.2	181.3	487.6	16.5
35463	Power-driven handtools, engine (internal combustion) driven -----	6	2.2	46.7	1.3	2.6	24.4	134.6	231.1	362.7	(D)

See footnotes at end of table.

**Table 5a. Industry Statistics by Industry and Primary Product Class Specialization: 1987—Con.**

[Table presents selected statistics for establishments according to their degree of specialization in products primary to their industry. Measures of plant specialization shown are (1) industry specialization: ratio of primary product shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment; and (2) product class specialization: ratio of largest primary product class shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment. See appendix for method of computing ratios. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry or product class code	Industry or primary product class	All establishments (number)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)				
3547	<b>Rolling mill machinery:</b> All establishments in industry -----	86	3.9	120.7	2.2	4.7	57.4	284.9	249.7	467.8	7.1
35471	Establishments with this product class primary: Hot rolling mill machinery (except tube rolling) -----	9	1.8	56.3	.9	1.8	22.3	163.8	135.3	237.5	3.3
35472	Cold rolling mill machinery -----	5	.6	17.7	.4	.8	11.3	34.8	30.3	62.2	2.1
35473	Rolling mill machinery, n.e.c., and parts -----	30	1.3	40.0	.8	1.7	20.3	74.7	70.2	142.5	1.4
3548	<b>Welding apparatus:</b> All establishments in industry -----	225	18.7	541.5	11.5	24.2	292.9	1 084.4	1 062.1	2 104.6	45.4
35481	Establishments with this product class primary: Arc welding machines, components, and accessories -----	35	5.6	151.5	3.5	7.1	82.3	266.5	324.7	566.8	16.4
35482	Arc welding electrodes, metal -----	17	5.0	178.9	3.1	6.6	97.6	361.6	386.4	741.0	14.0
35483	Resistance welders, components, accessories, and electrodes -----	37	2.9	93.4	2.0	4.5	54.6	149.8	132.4	277.4	4.1
35484	Gas welding and cutting equipment -----	23	2.4	47.0	1.4	2.8	23.9	124.3	83.2	207.1	2.3
35485	Other welding equipment, except ultrasonic and laser -----	18	1.6	40.2	.8	1.6	17.4	116.3	78.9	189.9	5.7
3549	<b>Metalworking machinery, n.e.c.:</b> All establishments in industry -----	302	11.5	338.8	7.0	14.7	181.9	593.3	451.6	1 055.0	21.4
35492	Establishments with this product class primary: Assembly machines -----	80	5.2	177.7	3.2	7.1	98.5	278.3	241.6	520.3	9.1
35495	Metalworking machinery, n.e.c. -----	61	3.6	104.1	2.0	4.2	48.8	208.6	139.9	355.3	8.2

Note: For qualifications of data, see footnotes on table 1a-1.

**Table 5b. Industry-Product Analysis—Value of Shipments and Primary Product Shipments and Specialization and Coverage Ratios for the Industry: 1987 and Earlier Census Years**

[An establishment is assigned to an industry based on shipment values of products representing largest amount considered primary to an industry. Frequently, establishment shipments comprise mixtures of products assigned to an industry (primary), those considered primary to other industries (secondary), and receipts for activities such as merchandising or contract work. Columns A-D show this product pattern for an industry, and column E shows primary product specialization ratio. The extent to which an industry's primary products are shipped by establishments classified in and out of an industry is shown in columns F-H and coverage ratio is shown in column I. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and product group code	Industry and census year	Value of shipments					Value of primary product shipments				
		Total (million dollars)	Primary products (million dollars)	Secondary products (million dollars)	Miscellaneous receipts (million dollars)	Primary product specialization ratio col. B ÷ col. B+C (percent)	Total made in all industries (million dollars)	Made in this industry (million dollars)	Made in other industries (million dollars)	Coverage ratio col. B ÷ col. F (percent)	
3541	Machine tools, metal cutting types -----	1987	3 189.5	2 394.1	484.8	310.6	83	2 585.2	2 394.1	191.2	93
		1982	4 440.2	3 877.2	369.5	193.6	91	4 154.7	3 877.2	277.5	93
		1977	2 812.7	2 353.9	337.0	121.8	87	2 560.5	2 353.9	206.6	92
3542	Machine tools, metal forming types -----	1987	1 396.3	1 186.1	116.7	93.5	91	1 370.3	1 186.1	184.3	87
		1982	1 428.7	1 210.5	143.6	74.6	89	1 383.9	1 210.5	173.4	87
		1977	1 130.6	967.1	111.6	51.9	90	1 114.7	967.1	147.6	87
3543	Industrial patterns -----	1987	499.4	445.0	36.5	17.9	92	557.9	445.0	112.9	80
		1982	452.3	428.8	13.4	10.1	97	561.5	428.8	132.7	76
		1977	320.6	308.9	9.5	2.2	97	411.9	308.9	103.0	75
3544	Special dies, tools, jigs, and fixtures -----	1987	7 550.1	6 678.0	418.8	453.2	94	8 142.8	6 678.0	1 464.8	82
		1982	5 374.9	4 795.1	298.3	281.5	94	6 093.9	4 795.1	1 304.2	79
		1977	3 905.3	3 498.4	219.0	187.9	94	4 450.2	3 498.4	951.8	79
3545	Machine tool accessories -----	1987	3 594.8	3 162.9	211.2	220.8	94	3 417.8	3 162.9	255.0	93
		1982	3 163.9	2 740.5	241.5	181.9	92	3 069.1	2 740.5	328.6	89
		1977	2 383.0	1 969.9	254.2	158.9	89	2 238.9	1 969.9	269.0	88
3546	Power-driven handtools -----	1987	2 161.8	1 609.5	335.6	216.6	83	1 886.1	1 609.5	276.6	85
		1982	1 795.3	1 457.3	194.2	143.7	88	1 594.8	1 457.3	137.5	91
		1977	1 623.2	1 349.8	126.0	147.5	91	1 496.5	1 349.8	146.7	90
3547	Rolling mill machinery -----	1987	467.8	378.0	32.3	57.5	92	403.0	378.0	25.0	94
		1982	502.9	352.5	91.7	58.7	79	445.1	352.5	92.6	79
		1977	507.4	309.5	87.4	110.6	78	361.0	309.5	51.5	86
3548	Welding apparatus -----	1987	2 104.6	1 772.3	200.1	132.2	90	1 918.0	1 772.3	145.7	92
3549	Metalworking machinery, n.e.c. -----	1987	1 055.0	898.8	112.7	43.6	89	1 026.1	898.8	127.4	88

Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendixes. For comparability of product classes and product codes between 1982 and 1987, see appendixes. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987			1982		
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>	
			Quantity <sup>2</sup>	Value (million dollars)		Quantity <sup>2</sup>	Value (million dollars)
3541--	<b>MACHINE TOOLS, METAL CUTTING TYPES</b>						
	<b>Total</b>	(NA)	(X)	2 585.2	(NA)	(X)	4 154.7
3541D --	Boring machines (excluding machining centers) and drilling machines (excluding machining centers):						
3541D 00	Boring machines (excluding machining centers) and drilling machines (excluding machining centers) (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	56	(X)	157.0	72	(X)	266.0
35413 --	Gear cutting machines:						
35413 00	Gear cutting machines (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	10	(X)	62.4	11	(X)	87.3
35414 --	Grinding, polishing, buffing, honing, and lapping machines, except gear-tooth grinding, lapping, polishing, and buffing machines:						
35414 00	Grinding, polishing, buffing, honing, and lapping machines, except gear-tooth grinding, lapping, polishing, and buffing machines (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	98	(X)	396.1	90	(X)	515.3
35415 --	Lathes:						
35415 00	Lathes (turning machines) (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	43	(X)	266.5	45	(X)	523.6
35416 --	Milling machines:						
35416 00	Milling machines, excluding machining centers (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	30	(X)	197.2	34	(X)	264.5
3541A --	Machining centers:						
3541A 00	Machining centers (multifunction numerically controlled machines) (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	32	(X)	231.7	22	(X)	365.7
3541B --	Station type machines:						
3541B 00	Station type machines (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	30	(X)	316.4	34	(X)	735.4
3541C --	Other metal cutting machine tools:						
3541C 00	Other metal cutting machine tools (except those designed primarily for home workshops, laboratories, etc.), including broaching machines, planers, shapers (except gear shapers and slotters), sawing and cut-off machines, tapping machines, threading machines, spark erosion, ultrasonic, and electrolytic machines, n.e.c., etc. (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	95	(X)	189.1	94	(X)	250.6
35418 --	Machine tools designed primarily for home workshops, laboratories, garages, etc. (metalworking and primarily metalworking only) -----	(NA)	(X)	97.2	(NA)	(X)	85.7
35418 11	Drilling machines ----- thousands	5	(S)	8.8	6	(S)	9.6
35418 31	Grinding and polishing machines, including crankshaft regrinding and valve grinding machines ----- do	13	(S)	22.6	17	(S)	26.5
35418 51	Lathes ----- do	3	(S)	11.0	9	(S)	9.0
35418 71	Sawing and cut-off machines ----- do	10	(S)	17.5			
35418 91	Other metalworking (or primarily metalworking) types, including automotive cylinder reborning machines ----- do	14	(S)	30.8	19	(S)	40.3
35418 00	Machine tools designed primarily for home workshops, laboratories, garages, etc. (metalworking and primarily metalworking only), n.s.k. -----	(NA)	(X)	6.6	(NA)	(X)	.3
35419 --	Parts for metal cutting type machine tools, sold separately, and rebuilt metal cutting type machine tools -----	(NA)	(X)	577.5	(NA)	(X)	891.9
35419 11	Parts for metal cutting machine tools, sold separately -----	124	(X)	380.3	206	(X)	725.3
	Rebuilt metal cutting type machine tools:						
35419 21	Spark erosion, ultrasonic, and electrolytic machines ----- number	3	(D)	( <sup>3</sup> )			
35419 22	Machining centers and multistation machines ----- do	10	(S)	44.5			
35419 23	Lathes ----- do	17	(S)	46.4			
35419 24	Drilling, threading, milling, boring, or tapping machines ----- do	27	(S)	31.1	65	(X)	153.9
35419 25	Deburring, sharpening, grinding, honing, lapping, and other finishing machines ----- do	15	(S)	16.6			
35419 26	Other rebuilt metal cutting machine tools ----- do	13	(S)	35.7			
35419 00	Parts for metal cutting type machine tools, sold separately, and rebuilt metal cutting type machine tools, n.s.k. -----	(NA)	(X)	22.9	(NA)	(X)	12.7
35410 --	Machine tools, metal cutting types, n.s.k. -----	(NA)	(X)	94.2	(NA)	(X)	168.7
35410 00	Machine tools, metal cutting, n.s.k., typically for establishments with 10 employees or more (see note) -----	(NA)	(X)	94.2	(NA)	(X)	27.4
35410 02	Machine tools, metal cutting, n.s.k., typically for establishments with less than 10 employees (see note) -----	(NA)	(X)	-	(NA)	(X)	141.3

See footnotes at end of table.

Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendixes. For comparability of product classes and product codes between 1982 and 1987, see appendixes. For meaning of abbreviations and symbols, see introductory text.]

1987 product code	Product	1987		1982	
		Number of companies with shipments of \$100,000 or more	Value of product shipments <sup>1</sup> (million dollars)	Number of companies with shipments of \$100,000 or more	Value of product shipments <sup>1</sup> (million dollars)
3542- --	<b>MACHINE TOOLS, METAL FORMING TYPES</b>				
	<b>Total</b>	(NA)	1 370.3	(NA)	1 383.9
35421 --	Punching, shearing, bending, and forming machines:				
35421 00	Punching and shearing machines (including power and manual) and bending and forming machines (power only) (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	94	334.4	94	317.3
35422 --	Presses, except forging and die stamping:				
35422 00	Metalworking presses (except forging and die stamping presses) (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	60	268.9	76	369.2
35423 --	Other metal forming machine tools, including forging and die stamping machines:				
35423 00	Other metal forming machine tools, including forging and die stamping machines, thread rolling machinery, die casting machines, riveting machines (except handheld portable types), can, barrel, and drum metal container making machines, etc. (for additional detail, see Current Industrial Report MQ-35W, Metalworking Machinery) -----	66	307.0	74	217.0
35424 --	Parts for metal forming machine tools and rebuilt metal forming machine tools	(NA)	392.9	(NA)	380.0
35424 01	Parts for metal forming machine tools (sold separately):				
35424 02	For die casting machines -----	9	12.2		
	For other metal forming machine tools -----	91	307.9	141	318.0
35424 03	Rebuilt metal forming machine tools:				
35424 04	Die casting machines -----	2	(*)		
	Machines, including presses, for working metal by hammering, forging, die stamping, bending, folding, straightening, flattening, pinching, shearing, or notching -----	18	23.9	24	60.0
35424 05	Other rebuilt metal forming machine tools -----	7	424.3		
35424 00	Parts for metal forming machine tools and rebuilt metal forming machine tools, n.s.k. -----	(NA)	24.6	(NA)	2.0
35420 --	Machine tools, metal forming types, n.s.k. -----	(NA)	67.3	(NA)	100.5
35420 00	Machine tools, metal forming types, n.s.k., typically for establishments with 10 employees or more (see note) -----	(NA)	67.3	(NA)	56.9
35420 02	Machine tools, metal forming types, n.s.k., typically for establishments with less than 10 employees (see note) -----	(NA)	-	(NA)	43.6
3543- --	<b>INDUSTRIAL PATTERNS</b>				
	<b>Total</b>	(NA)	557.9	(NA)	561.5
35430 --	Industrial patterns, except shoe patterns:				
35430 11	Foundry patterns -----	435	341.5	562	350.1
35430 98	All other industrial patterns (except shoe patterns) -----	119	83.1	218	133.8
35430 00	Industrial patterns, n.s.k., typically for establishments with 5 employees or more (see note) -----	(NA)	83.1	(NA)	45.2
35430 02	Industrial patterns, n.s.k., typically for establishments with less than 5 employees (see note) -----	(NA)	50.3	(NA)	32.4
3544- --	<b>SPECIAL DIES, TOOLS, JIGS, AND FIXTURES</b>				
	<b>Total</b>	(NA)	8 142.8	(NA)	6 099.3
35441 --	Special dies and tools, die sets, jigs, and fixtures	(NA)	4 219.7	(NA)	3 425.9
	Jigs and fixtures, all types:				
35441 13	Gauging and checking types:				
35441 15	Less than 1,000 lb weight -----	285	187.3	234	157.4
	1,000 lb weight or more -----	60	47.5	53	48.3
35441 17	All other jigs and fixtures (holding, positioning, layout, assembly, etc.):				
35441 18	Less than 1,000 lb weight -----	401	284.5	440	258.6
35441 19	1,000 lb weight or more -----	136	168.1	141	330.9
	Standard catalog components and parts for jigs and fixtures, including drill bushings -----	44	127.8	35	57.7
35441 21	Dies, metalworking only:				
	Press brake dies -----	37	31.2	32	23.9
35441 22	Forming and drawing dies:				
35441 24	500 lb weight or less -----	208	103.8	178	86.6
35441 26	501 to 3,000 lb weight -----	230	198.7	195	96.6
	More than 3,000 lb weight -----	148	311.8	111	212.7
35441 27	Stamping dies, including lamination and blanking dies:				
35441 28	Progressive type dies:				
35441 25	High speed steel -----	467	296.0	533	342.5
35441 26	Carbide -----	96	75.1	108	88.0
35441 25	Other -----	242	157.5		
35441 23	All other stamping type dies (punch, trim, notch, pierce, perforate, etc.) -----	379	543.0	496	611.1
35441 33	Forging dies, including cold forging and heading:				
35441 35	Open die type -----	42	43.8	49	26.2
	Closed die type -----	98	102.2	80	79.2
35441 43	Extrusion and wiredrawing and straightening dies:				
35441 45	High speed steel -----	30	45.1	62	60.8
35441 42	Carbide -----	34	34.3	36	31.6
35441 44	Ceramic and ceramic composite -----	1	3	(5)	(5)
	Other -----	32	56.2	(5)	(5)

See footnotes at end of table.

Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendixes. For comparability of product classes and product codes between 1982 and 1987, see appendixes. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987		1982	
		Number of companies with shipments of \$100,000 or more	Value of product shipments <sup>1</sup> (million dollars)	Number of companies with shipments of \$100,000 or more	Value of product shipments <sup>1</sup> (million dollars)
3544- --	<b>SPECIAL DIES, TOOLS, JIGS, AND FIXTURES—Con.</b>				
35441 --	Special dies and tools, die sets, jigs, and fixtures—Con. Dies, metalworking only—Con.				
35441 46	All other dies: High speed steel-----	74	41.8	67	42.3
35441 47	Carbide-----	48	52.0	43	40.1
35441 48	Other-----	100	62.2	581	560.8
35441 73	Standard and special components and parts for dies: Die sets-----	59	91.3	43	78.2
35441 75	Standard punches: Steel-----	86	130.1	60	68.6
35441 77	Carbide-----	24	10.3	29	11.5
35441 78	Other-----	102	124.5	57	79.3
35441 83	Industrial models and prototypes-----	217	267.6		
35441 89	Other specially designed tooling-----	275	354.2	325	350.6
35441 00	Special dies and tools, die sets, jigs, and fixtures, n.s.k.-----	(NA)	271.4	(NA)	182.3
35442 --	Industrial molds and mold boxes-----	(NA)	2 523.2	(NA)	1 800.6
	Industrial molds made of metal: Molds for metal or metal carbides (except ingot molds): Injection or compression types (die casting dies)-----	273	265.9	304	213.2
35442 11	Other types-----	55	36.6	49	40.6
35442 13	Molds for wax: Injection or compression types-----	71	61.7		
35442 15	Other types-----	11	3.6	81	56.2
35442 16	Molds for mineral materials: Injection or compression types-----	10	(6)		
35442 17	Other types-----	3	627.6		
35442 18	Molds for glass: Injection or compression types-----	18	107.4	(7)	(7)
35442 19	Other types-----	4	2.6		
35442 23	Molds for rubber: Injection or compression types-----	104	104.8	118	104.8
35442 41	Other types-----	38	42.1		
35442 42	Molds for plastics: Injection types-----	1 181	1 378.3	1 084	1 008.0
35442 51	Compression types, including matched metal molds-----	142	114.9	118	79.3
35442 55	All other types, including transfer, plunger, and rotational molds-----	137	129.1	119	68.5
35442 59	Molds for other materials-----	51	60.1		
35442 45	Mold bases-----	31	40.5	765	7143.2
35442 47	Industrial molds made of materials other than metal-----	41	48.3		
35442 63	Mold boxes or flasks for use with patterns and sand molds in foundries-----	9	7.1	40	39.5
35442 67	Industrial molds and mold boxes, n.s.k.-----	(NA)	92.6	(7)	(7)
35442 00				(NA)	47.3
35440 --	Special dies, tools, jigs, and fixtures, n.s.k.-----	(NA)	1 399.9	(NA)	872.8
35440 00	Special dies, tools, jigs, and fixtures, n.s.k., typically for establishments with 5 employees or more (see note)-----	(NA)	988.2	(NA)	501.7
35440 02	Special dies, tools, jigs, and fixtures, n.s.k., typically for establishments with less than 5 employees (see note)-----	(NA)	411.7	(NA)	371.1
3545- --	<b>MACHINE TOOL ACCESSORIES</b>				
	<b>Total</b> -----	(NA)	3 417.8	(NA)	3 069.1
35451 --	Small cutting tools for machine tools and metalworking machinery-----	(NA)	1 880.8	(NA)	1 755.7
35451 14	Broaches (excluding holders and burnishing bars)-----	35	83.1	39	85.9
	Twist drills (excluding combined drills, countersinks, and gun drills): Carbon steel and high speed steel: 1/2 in. or less diameter, taper shank-----	14	14.8	14	30.7
35451 16	1/2 in. or less diameter, straight shank-----	26	168.9	24	133.6
35451 17	More than 1/2 in. diameter, taper shank-----	16	19.1	12	12.6
35451 18	More than 1/2 in. diameter, straight shank-----	20	28.0	17	31.3
35451 19	Carbide, solid and tipped (excludes tips and blanks sold separately and masonry drills)-----	32	50.9	25	35.5
35451 24	Masonry drill bits-----	14	40.0	12	27.6
35451 22	Gun drills and gun reamers-----	11	14.0	18	22.9
35451 25	Combination drills and countersinks-----	14	10.1	12	13.2
35451 26	Countersinks, including port cutters, etc. (excluding combined drills and countersinks and pilots for interchangeable pilot types)-----	25	12.2	18	7.8
35451 27	Counterbores, including spot facers, etc. (excluding pilots for interchangeable pilot types)-----	20	7.8	31	12.6
35451 29	Reamers (all types, but excluding gun reamers): Carbon steel and high speed steel, including blades sold separately-----	26	30.9	31	28.5
35451 32	Carbide, solid and tipped (excluding tips and blanks sold separately), including replaceable blades sold separately-----	32	26.9	33	15.5
35451 36	Hobs, all types-----	5	(D)	8	32.0
35451 42	Gear shaper cutters and gear shaving cutters-----	9	47.5	9	35.6
35451 47	End mills and milling cutters: End mills, solid and tipped, die-sinking, contour, tracer, hollow mills, etc. (excluding inserted blade types and shell mills): High speed steel-----	36	97.4	37	92.2
35451 51	Carbide, solid and tipped (excluding blades sold separately)-----	37	58.6	40	32.1
35451 52	Inserted blade type cutters, all types, complete: Nonindexable-----	10	7.0	12	7.4
35451 53	Indexable or throwaway insert types-----	21	25.8	13	15.6
35451 54	Form relieved cutters, including high speed steel and carbide (solid and tipped)-----	10	6.2	20	16.4
35451 58	Slitting saws and screw slotting cutters, including high speed steel and carbide (solid and tipped)-----	14	15.2	12	10.9
35451 59	Milling cutters, n.e.c.: High speed steel-----	16	46.1	19	49.0
35451 61	Carbide, solid and tipped (excluding tips and blanks sold separately)-----	15	11.1	13	5.7

See footnotes at end of table.

Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendixes. For comparability of product classes and product codes between 1982 and 1987, see appendixes. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987		1982	
		Number of companies with shipments of \$100,000 or more	Value of product shipments <sup>1</sup> (million dollars)	Number of companies with shipments of \$100,000 or more	Value of product shipments <sup>1</sup> (million dollars)
<b>3545- --</b>	<b>MACHINE TOOL ACCESSORIES—Con.</b>				
35451 --	Small cutting tools for machine tools and metalworking machinery—Con.				
	Threading tools:				
35451 77	Taps (excluding taps in threading sets and screw plates and inserted chaser types):	9	5.4	9	7.1
	Carbon steel and carbide				
	High speed steel:				
35451 70	Cut thread	7	9.2	10	22.9
35451 71	Ground thread	21	111.6	23	92.5
35451 73	Dies, with two or more thread-forming edges integral with the body (including round, square, hexagonal, spring, two-piece, and adjustable types) (excluding inserted chaser types and dies sold in threading sets or screw plates)	8	19.9	8	23.1
35451 75	Chasers, single edge thread cutting, circular blade, and tangent types for mounting into or onto holders, die heads, and tap bodies (excluding all die heads, tap bodies, and chaser holders)	9	31.9	9	23.1
35451 87	Thread rolling dies, including circular, flat, and planetary	10	34.5	13	29.8
35451 89	Other threading tools, including screw plates and threading sets	8	6.4	11	14.0
35451 65	Single and double point tools:				
35451 66	High speed steel	15	10.7	27	12.7
35451 66	Carbide, solid and tipped (excluding rough blanks, and tips and blanks sold separately)	25	27.6	45	44.1
35451 68	Other materials	15	18.6	12	11.1
35451 72	Circular form tools, including semifinished blanks	16	43.7	16	29.7
	Blanks, tips, and inserts <sup>2</sup> :				
	Molded blanks and tips (excluding pressed-to-size inserts):				
35451 91	Carbide	30	85.2	28	74.0
35451 93	Other than carbide	6	10.2	8	10.5
	Inserts, indexable and throwaway types:				
35451 82	Carbide:				
35451 82	Utility ground	10	46.7	14	85.1
35451 83	Precision ground	38	172.9	42	149.7
35451 84	Pressed to size, including inserts with center holes and with molded chip breakers	12	(D)	13	84.5
35451 95	Ceramic	5	26.4	5	2.9
35451 96	Other than carbide and ceramic	7		7	2.9
	Inserts, other than indexable and throwaway types:				
35451 86	Carbide	14	20.6	15	22.3
35451 97	Ceramic	1		8	7.2
35451 99	Other than carbide and ceramic	-	.6		
	Other types of cutting tools for machine tools, n.e.c., including rotary burrs, rotary files, and spade drills:				
35451 92	Carbon steel	24	42.1	32	47.6
35451 94	High speed steel	34	35.1	50	53.2
35451 98	Carbide, solid and tipped (excluding tips and blanks sold separately)	52	72.4	62	52.1
35451 00	Small cutting tools for machine tools and metalworking machinery, n.s.k.	(NA)	107.7	(NA)	99.1
35454 --	Attachments and accessories for machine tools and metalworking machinery, n.e.c.	(NA)	542.6	(NA)	593.6
	Tool holders:				
35454 12	Turning tool holders, mechanically clamping for inserts and bits (except box tools and screw machine tool holders)	28	70.4	34	93.1
35454 14	Boring bars and heads	33	45.4	29	49.8
35454 17	Drilling, reaming, and tapping chucks	10	39.7	9	18.8
35454 31	Special tooling and attachments for screw and automatic machines (box tools, tool holders, turrets, rollers, etc.) except standard cutting bits and tools	17	9.6	19	19.3
35454 37	Die heads and tap bodies for chaser type threading and thread-rolling heads (excludes hand type die stocks)	8	10.4	5	5.1
35454 38	Other tool holders, including other chucks, drill heads, tool posts, turrets, sleeves, sockets, etc.	37	74.9	38	74.4
	Work holding devices:				
35454 45	Rotary tables and indexing work holders, including numerically controlled	13	27.5	17	34.7
35454 59	Other work holding and positioning devices, including vises, mandrels, feeding fingers and collets, clamps, stops, face plates, spacers, etc.	71	129.9	80	129.0
	Other attachments and accessories for machine tools and metalworking machinery, etc.:				
35454 41	Tracer and tapering attachments, safety devices, centers, dogs, work rests, chutes, etc. (excluding cutting tools, tool end work holders, jigs, fixtures, dies, and molds)	5	3.9	15	9.1
35454 43	Lathe chucks	10	17.7	7	24.2
35454 51	Tool room specialties, including levels, angle plates, parallels, sine bars, V-blocks, flats, etc.	7	5.3	69	115.5
35454 98	Other attachments and accessories	69	93.2		
35454 00	Attachments and accessories for machine tools and metalworking machinery, n.e.c., n.s.k.	(NA)	14.6	(NA)	20.7
35455 --	Precision measuring tools (inspection, quality control, tool room, and machinists')	(NA)	440.9	(NA)	402.7
35455 11	Comparators (excluding optical)	7	6.1	11	26.7
	Fixed size limit gauges (American Gauge Design Type C58-61):				
35455 13	Fixture type	25	28.4	27	18.5
35455 15	Thread type	23	30.4	20	30.9
35455 17	Adjustable size limit gauges	15	21.2	14	15.9
35455 21	Gauge blocks	6	6.0	5	6.6
35455 61	Dial Indicators	8	16.2	7	23.1
35455 65	Micrometers and calipers	6	20.6	7	24.8
35455 71	Pneumatic and electronic gauges (manual and automatic)	12	94.8	23	94.9

See footnotes at end of table.

Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendixes. For comparability of product classes and product codes between 1982 and 1987, see appendixes. For meaning of abbreviations and symbols, see introductory text.]

1987 product code	Product	1987		1982	
		Number of companies with shipments of \$100,000 or more	Value of product shipments <sup>1</sup> (million dollars)	Number of companies with shipments of \$100,000 or more	Value of product shipments <sup>1</sup> (million dollars)
3545—	<b>MACHINE TOOL ACCESSORIES—Con.</b>				
35455 —	Precision measuring tools (inspection, quality control, tool room, and machinists')—Con.				
	Coordinate and contour measuring machines (inspection and gauging) and parts (sold separately):				
	Complete units:				
35455 94	Conventional	4	56.6	12	55.2
35455 95	Numerically controlled	4	.4	(10)	(10)
35455 96	Parts	2	—	10	11.9
35455 91	Gear checking instruments	—	—		
	Gear checking machines and parts (sold separately):				
	Complete units	3	(D)		
35455 92	Parts	3	(D)		
35455 93	Surface texture measuring machines and parts (sold separately):				
35455 81	Complete units	4	(11)		
35455 83	Parts	1	117.8	1030	1076.3
35455 97	Other machinists' precision measuring tools (including dividers)	23	97.9		
35455 98	Parts and accessories for machinists' precision measuring tools (sold separately)	9	21.7		
35455 00	Precision measuring tools, n.s.k.	(NA)	18.7	(NA)	17.9
35450 —	Machine tool accessories, n.s.k.	(NA)	553.6	(NA)	317.0
35450 00	Machine tool accessories, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	365.8	(NA)	217.7
35450 02	Machine tool accessories, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	187.8	(NA)	99.3
1987 product code	Product	1987		1982	
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>	Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>
		Quantity <sup>2</sup>	Value (million dollars)	Quantity <sup>2</sup>	Value (million dollars)
3546—	<b>POWER-DRIVEN HANDTOOLS</b>				
	<b>Total</b>	(NA)	(X)	1 886.1	(NA)
35461 —	Power-driven handtools, electric (including battery powered)	(NA)	(X)	1 061.9	(NA)
	Drills:				
35461 01	Armature mounted primarily on sleeve bearings:				
35461 03	1/4 in. (6.35 mm) chuck size or less	1	4 926.6	6	3 403.6
35461 04	5/16 in. (7.94 mm) to less than 1/2 in. (12.70 mm)	4	132.6		70.9
	1/2 in. (12.70 mm) or more	5	—		
35461 05	Armature mounted primarily on other than sleeve bearings:				
35461 07	1/4 in. (6.35 mm) chuck size or less	2	1 417.0	5	95.2
35461 09	5/16 in. (7.94 mm) to less than 1/2 in. (12.70 mm)	6	56.4	7	979.1
35461 22	1/2 in. (12.70 mm) or more	6	668.0	7	44.3
35461 21	Screwdrivers and nut-runners	7	2 601.9	5	339.1
35461 23	Hammers, percussion and rotary, without drill chuck	4	63.1	5	147.9
35461 25	Hammers—drills, with a drill chuck	4	84.7	5	24.6
35461 28	Impact wrenches	3	(D)	7	7.8
35461 31	Shears and nibblers	5	(D)	7	83.0
35461 32	Planers	5	58.6	8	12.8
	Routers	2	801.7	6	91.3
	Polishers, circular sanders, and grinders (except bench grinders):	6	44.0	6	10.5
35461 26	Right-angle polishers, circular sanders, and grinders	5	765.2	10	5.8
35461 29	All other polishers, circular sanders, and grinders (including die grinders, but excluding bench)	5	641.2	10	848.7
	Sanders (except circular):				
35461 33	Belt	7	633.7	8	9.1
35461 34	Oscillating, reciprocating, and vibrating	6	1 041.9	7	619.8
	Saws, circular:				
35461 12	Armature mounted primarily on sleeve bearings	4	1 565.5	4	30.7
	Armature mounted primarily on other than sleeve bearings:				
35461 15	7 in. (177.80 mm) blade or less	2	72.3	4	26.9
35461 16	More than 7 in. (177.80 mm) to less than 8 in. (203.20 mm) blade	5	1 429.0	6	2.5
35461 17	8 in. (203.20 mm) blade or more	4	82.1	4	634.3
	Saws—jig, saber, reciprocating:				
35461 18	Armature mounted on ball bearings	6	714.3	9	37.1
35461 19	Armature mounted on other than ball bearings	4	56.1	1 916.6	49.1
35461 37	Chain saws	4	1 415.6	4	(13)
35461 35	Other electric-powered handtools	4	31.8	(D)	13 166.6
35461 36	Parts, attachments, and accessories for electric-powered handtools (sold separately), excluding saw blades, drill bits, screwdrivers, motors, and switches	18	384.0	4	
	Power-driven handtools, electric (including battery powered), n.s.k.	21	(S)	18	
35461 00		(NA)	(X)	205.1	209.2
				5.8	9.9

See footnotes at end of table.

Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendixes. For comparability of product classes and product codes between 1982 and 1987, see appendixes. For meaning of abbreviations and symbols, see introductory text.]

1987 product code	Product	1987			1982		
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>	
			Quantity <sup>2</sup>	Value (million dollars)		Quantity <sup>2</sup>	Value (million dollars)
3546- --	<b>POWER-DRIVEN HANDTOOLS—Con.</b>						
35462 --	Power-driven handtools, pneumatic, hydraulic, and powder-actuated						
35462 38	Pneumatic:						
35462 37	Drills, screwdrivers, and nut-runners	12	(X)	508.5	(NA)	(X)	382.4
35462 41	Percussion tools (such as runners, riveters, chippers, scalers)	7	(S)	81.9	15	223.5	51.8
35462 42	Impact wrenches	7	(S)	24.0	15	(S)	22.7
35462 44	Grinders, polishers, and sanders:						
35462 47	Rotary	13	(S)	40.3	11	253.4	45.7
35462 51	Other	4	(S)	52.9	14	438.2	41.2
35462 61	Other pneumatic-powered handtools	20	(S)	7.0	35	(S)	66.8
35462 71	Parts, attachments, and accessories for pneumatic-powered handtools (sold separately), excluding drill bits, screwdrivers, etc.	18	(X)	134.5			
35462 72	Powder-actuated handtools	3	(S)	113.0	24	(X)	110.3
35462 79	Hydraulic:						
35462 79	Chain saws, including pole	1	(S)	(14)			
35462 79	Other hydraulic-powered handtools	7	(S)	148.0	12	(S)	30.3
35462 00	Parts, attachments, and accessories for powder-actuated and hydraulic handtools (sold separately) (excluding saw blades, drill bits, etc.)	7	(X)	22.4			
35463 --	Power-driven handtools, pneumatic, hydraulic, and powder-actuated, n.s.k.						
35463 01	Power-driven handtools, engine (internal combustion) driven						
35463 11	Chain saws	4	(X)	213.7	(NA)	(X)	326.5
35463 11	Other, including cut-off saws and drills	2	(S)	162.1	6	3 123.8	211.5
35463 12	Parts, attachments, and accessories for engine-driven handtools, sold separately (excluding saw blades, drill bits, engines, engine parts, etc.):						
35463 14	For chain saws	4	(D)	(15)	4	(S)	12.6
35463 00	For other than chain saws	3	(X)	1539.9	10	(X)	99.3
35460 --	Power-driven handtools, engine (internal combustion) driven, n.s.k.						
35460 00	Power-driven handtools, n.s.k., typically for establishments with 10 employees or more (see note)						
35460 02	Power-driven handtools, n.s.k., typically for establishments with less than 10 employees (see note)						
		1987			1982		
1987 product code	Product	Number of companies with shipments of \$100,000 or more	Value of product shipments <sup>1</sup> (million dollars)		Number of companies with shipments of \$100,000 or more	Value of product shipments <sup>1</sup> (million dollars)	
3547- --	<b>ROLLING MILL MACHINERY</b>						
	<b>Total</b>						
35471 --	Hot rolling mill machinery, including combination hot and cold (except tube rolling)						
35471 11	Blooming and slabbing mill machinery	(NA)	403.0	(NA)			445.1
35471 13	Plate rolling mill machinery, except tin plate machinery	(NA)	175.3	(NA)			180.5
35471 17	Hot strip mill machinery	2		(16)	5		(16)
35471 18	Other hot rolling mill machinery and equipment	3		31.6	3		4.8
35471 00	Hot rolling mill machinery, including combination hot and cold (except tube rolling), n.s.k.	10		141.0	5		166.4
35472 --	Cold rolling mill machinery	(NA)	2.6	(NA)	10		94.6
35472 21	Tandem roll mills	(NA)	67.2	(NA)			65.1
35472 23	Single stand roll mills	4		11.3	5		5.9
35472 27	Double stand roll mills	5		8.2	5		15.6
35472 28	Other cold rolling mill machinery and equipment	1		44.2	11		41.2
35472 00	Cold rolling mill machinery, n.s.k.	6		(NA)			2.3
35473 --	Rolling mill machinery, n.e.c. (including tube mill machinery) and parts for all rolling mill machinery	(NA)	3.5	(NA)			
35473 35	Tube mill machinery	(NA)	137.3	(NA)			188.2
35473 47	Processing lines, including pickling and cleaning, tinning, galvanizing, etc.	11	21.3	14			95.7
35473 48	Other rolling mill machinery and equipment, excluding parts	2		(17)			
35473 51	Machined rolls for rolling mills	6		1749.1	16		91.3
35473 52	Parts, excluding rolls, for rolling mill machinery (sold separately)	13		47.1			
35473 00	Rolling mill machinery, n.e.c. (including tube mill machinery) and parts for all rolling mill machinery, n.s.k.	18		17.2			
35470 --	Rolling mill machinery, n.s.k.	(NA)	2.7	(NA)			1.2
35470 00	Rolling mill machinery, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	23.2	(NA)			11.4
35470 02	Rolling mill machinery, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	10.4	(NA)			2.3
		(NA)	12.8	(NA)			9.1

See footnotes at end of table.

Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

(1)Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendixes. For comparability of product classes and product codes between 1982 and 1987, see appendixes. For meaning of abbreviations and symbols, see introductory text.

1987 product code	Product	1987			1982		
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>	
			Quantity <sup>2</sup>	Value (million dollars)		Quantity <sup>2</sup>	Value (million dollars)
<b>3548—</b>	<b>WELDING APPARATUS</b>						
	<b>Total</b>	(NA)	(X)	1 918.0	(NA)	(X)	1 606.6
35481 —	Arc welding machines, components, and accessories, except electrodes (excluding stud welding equipment)	(NA)	(X)	609.9	(NA)	(X)	511.6
	Arc welding machines:						
35481 01	Alternating current transformer arc welders:						
35481 02	300 amps or less	6	**183.4	37.2	9	(S)	27.1
	More than 300 amps	6	(S)	(1 <sup>8</sup> )	10	*1.0	20.8
35481 03	Direct current arc welders:						
35481 04	Generators only	3	(S)	(1 <sup>8</sup> )	11	(S)	137.7
	Rectifier types, including ac/dc	12	(S)	144.1			
35481 05	Complete units only:						
35481 06	Engine driven	3	41.7	78.5	5	41.1	79.6
	Motor driven	1	(S)	1 <sup>8</sup> 104.7	4	4.3	5.5
	Components and accessories for arc welding machines (except electrodes):						
35481 07	Automatic and semiautomatic wire drive apparatus and related accessories	10	(X)	36.5	12	(X)	37.8
35481 08	Special purpose automatic welding apparatus	12	(X)	16.3	12	(X)	14.5
35481 09	Automatic and semiautomatic welding torches, guns and cables, and related accessories	12	(X)	57.4	13	(X)	50.8
35481 11	Circuit welding accessories (including electrode holders, ground clamps, cable connectors, cables sold separately, etc.)	6	(X)	23.0	7	(X)	22.6
35481 12	Positioning and manipulating equipment (including turn rolls, head-and-tail stock, weld head manipulators, seamers, moving carriages, etc.)	9	(X)	21.1	15	(X)	34.1
35481 19	All other components and accessories for arc welding machinery, excluding welding rods and electrodes	17	(X)	52.0	21	(X)	73.9
35481 00	Arc welding machines, components, and accessories, except electrodes (excluding stud welding equipment), n.s.k.	(NA)	(X)	39.1	(NA)	(X)	7.2
35482 —	Arc welding electrodes, metal	(NA)	(X)	494.4	(NA)	(X)	469.6
	Stick electrodes (including solid, cored, covered, and bare electrodes):						
35482 01	Hard facing:						
35482 02	Manual coated	6	(S)	17.4	11	(1 <sup>9</sup> )	(1 <sup>9</sup> )
	Bare rod for oxy-acetylene applications, TIG	3	(S)				
35482 03	Other than hard facing:						
35482 04	Mild steel	8	*270.2	136.6	10	371.9	180.3
35482 05	Low alloy steel	6	(S)	32.5	8	15.9	11.0
35482 06	Stainless steel (chromium, 4 percent or more)	7	(S)		11	12.7	32.7
	Nonferrous	8	(S)	24.1	3	1 <sup>9</sup> 39.8	1 <sup>9</sup> 44.6
	Coiled and spooled continuous wire electrodes for automatic arc welding and inert gas shielded arc welding (including electrodes for submerged arc welding, base wire):						
35482 07	Hard facing:						
	Flux-cored and solid wire, self shielded and gas shielded, 7/64 in. or less	7	(S)	48.3	(NA)	(2 <sup>0</sup> )	(2 <sup>0</sup> )
35482 08	Flux-cored and solid wire, submerged arc welding (saw), 1/8 in. or more	3	(S)				
	Other than hard facing:						
35482 11	Solid wire:						
35482 12	Mild steel	6	214.6	102.5	6	107.3	67.2
35482 13	Low alloy steel	5	*11.4	13.2	3	(2 <sup>0</sup> )	(2 <sup>0</sup> )
35482 14	Stainless steel (chromium, 4 percent or more)	6	(S)	40.5	5	9.8	23.2
	Nonferrous	3	(S)		-	-	-
35482 15	Cored wire:						
35482 16	Mild steel	7	82.3	63.8	11	20109.7	2095.8
35482 00	Low alloy	5	3.6	3.7			
	Arc welding electrodes, metal, n.s.k.	(NA)	(X)	11.9	(NA)	(X)	14.8
35483 —	Resistance welders, components, accessories, and electrodes	(NA)	(X)	303.6	(NA)	(X)	187.8
	Resistance welders:						
35483 05	Spot and projection welders, single electrode	14	(S)	23.1	21	(S)	24.3
35483 06	Spot and projection welders, multielectrode	21	(S)	123.0	17	**1.1	74.8
35483 07	Seam welders	10	(S)	22.6	8	.2	11.7
35483 08	Other resistance welders, including flash, upset, and butt welders	11	(S)	13.1	13	(S)	39.2
35483 09	Resistance welder transformers (sold separately)	5	(S)	16.2	6	*8.3	7.5
35483 11							
35483 19	Resistance welder electrodes	4	(S)	13.4	17	(NA)	20.6
35483 00	Resistance welder components and accessories, including electrode holders, etc.	21	(X)	55.1			
	Resistance welders, components, accessories, and electrodes, n.s.k.	(NA)	(X)	37.0	(NA)	(X)	9.6
35484 —	Gas welding and cutting equipment, except plasma (including parts, attachments, and accessories)	(NA)	(X)	205.3	(NA)	(X)	226.6
35484 01	Torches, welding or cutting	12	(S)	37.7	15	(S)	67.4
35484 02	Cutting machines and carriages, stationary and portable	8	**2.8	38.4	9	(S)	28.5
35484 03	Other gas welding and cutting equipment, excluding pressure containers	10	(X)	31.9	5	(X)	19.0
	Spare parts, accessories, attachments, adaptors, etc., n.e.c., sold separately:						
35484 04	Tips	9	(X)	24.3	13	(X)	35.9
35484 05	Regulators, gas pressure	9	(S)	34.8	11	(S)	31.7
35484 09	All other	16	(X)	26.2	14	(X)	41.1
35484 00	Gas welding and cutting equipment, except plasma (including parts, attachments, and accessories), n.s.k.	(NA)	(X)	12.1	(NA)	(X)	2.9

See footnotes at end of table.

Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1987 and 1982—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendixes. For comparability of product classes and product codes between 1982 and 1987, see appendixes. For meaning of abbreviations and symbols, see introductory text.]

1987 product code	Product	1987			1982		
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>	
			Quantity <sup>2</sup>	Value (million dollars)		Quantity <sup>2</sup>	Value (million dollars)
3548- --	<b>WELDING APPARATUS—Con.</b>						
35485 --	Other welding equipment, components, and accessories (excluding arc, resistance, and gas)-----	(NA)	(X)	21182.6	(NA)	(X)	21148.4
35485 01	Stud welding equipment ----- number	2	(S)	21.3	5	(S)	14.7
35485 03	Friction welding equipment ----- do	1	(S)		5	(S)	12.2
35485 04	Plasma welding and cutting equipment ----- do	13	(S)	93.9	9	(S)	34.1
35485 05	All other welding equipment ----- thousands	12	(X)	2214.9	12	(X)	2211.9
35485 07	Soldering equipment (except hand and ultrasonic) ----- thousands	6	(S)	23.4	7	(S)	17.3
35485 09	Components and accessories for all other welding equipment, excluding arc welders, resistance welders, and gas welding and cutting equipment -----	9	(X)	21.3	13	(X)	58.2
35485 00	Other welding equipment, components, and accessories (excluding arc, resistance, and gas), n.s.k.-----	(NA)	(X)	7.7	(NA)	(X)	-
35480 --	Welding apparatus, n.s.k.-----	(NA)	(X)	122.1	(NA)	(X)	2362.7
35480 00	Welding apparatus, n.s.k., typically for establishments with 20 employees or more (see note)-----	(NA)	(X)	74.6	(NA)	(X)	2343.7
35480 02	Welding apparatus, n.s.k., typically for establishments with less than 20 employees (see note)-----	(NA)	(X)	47.5	(NA)	(X)	2319.0
3549- --	<b>METALWORKING MACHINERY, N.E.C.</b>						
	<b>Total</b> -----	(NA)	(X)	1 026.1	(NA)	(X)	780.2
35492 --	Assembly machines -----	(NA)	(X)				
35492 11	Rotary transfer (dial or rotary, trunnion, center column) ----- number	31	(S)	527.3	(NA)	(X)	367.6
35492 15	In-line transfer, synchronous ----- do	26	(S)	54.0	23	(S)	29.2
35492 17	In-line transfer, nonsynchronous ----- do	21	(S)	37.6	19	(S)	53.9
35492 13	Special purpose and other types ----- do	72	(S)	103.9	13	**119	119.7
35492 18	Parts and attachments for assembly machines (sold separately) -----	18	(X)	275.5	48	(S)	140.8
35492 00	Assembly machines, n.s.k.-----	(NA)	(X)	15.7	(NA)	(X)	24.0
35495 --	Metalworking machinery (except handheld and ultrasonic), n.e.c.-----	(NA)	(X)	336.9	(NA)	(X)	313.0
	Machines for weaving and other wire fabricating and wiredrawing machines and draw benches:-----						
35495 01	Draw benches and wiredrawing machines (except dies)-----	7	(X)	18.1			
35495 02	Wire rope or wire cable making machines -----	6	(X)	15.3	38	(X)	86.3
35495 03	Other machines for working wire -----	12	(X)	55.6			
35495 43	Coil handling equipment (conversion or straightening):-----						
35495 45	Cut-to-length lines -----	12	(X)	56.9	18	(X)	63.4
35495 45	Slitting lines -----	6	(X)	20.8	9	(X)	26.7
35495 92	Other metalworking machinery -----	48	(X)	124.6			
35495 95	Parts and attachments for other metalworking machinery (sold separately) -----	15	(X)	23.1	63	(X)	117.2
35495 00	Metalworking machinery (except handheld and ultrasonic), n.e.c., n.s.k.-----	(NA)	(X)	22.5	(NA)	(X)	19.4
35490 --	Metalworking machinery, n.e.c., n.s.k.-----	(NA)	(X)	161.8	(NA)	(X)	2399.6
35490 00	Metalworking machinery, n.e.c., n.s.k., typically for establishments with 10 employees or more (see note)-----	(NA)	(X)	137.4	(NA)	(X)	2379.8
35490 02	Metalworking machinery, n.e.c., n.s.k., typically for establishments with less than 10 employees (see note)-----	(NA)	(X)	24.4	(NA)	(X)	2319.8

Note: In 1987 Census of Manufactures, data for establishments of small single unit companies with up to 20 employees were estimated from administrative-record data rather than data actually collected from respondents. Employment cutoffs used for administrative records for each industry and shipments figures are included in code ending with "002". In both 1987 and 1982 Censuses of Manufactures, products not completely identified on standard forms were coded in appropriate product class (five-digit) followed by "00" or to appropriate product group code (four-digit) followed by "000".

<sup>1</sup>Data reported by all producers, not just those with shipments of \$100,000 or more.

<sup>2</sup>For some establishments, data have been estimated from central unit values which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: \* 10 to 19 percent estimated; \*\* 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

<sup>3</sup>For 1987, data for product code 35419 21 are combined with product code 35419 26 to avoid disclosing data for individual companies.

<sup>4</sup>For 1987, data for product code 35424 03 are combined with product code 35424 05 to avoid disclosing data for individual companies.

<sup>5</sup>For 1982, data for product codes 35441 42 and 35441 44 were not published separately but were included with product code 35441 48.

<sup>6</sup>For 1987, data for product codes 35442 17 and 35442 18 are combined to avoid disclosing data for individual companies.

<sup>7</sup>For 1982, data for product codes 35442 17, 35442 18, 35442 19, 35442 23, 35442 47, and 35442 67 were not collected separately but were included with product code 35442 45.

<sup>8</sup>Single point tools are one-piece single point or multiple point tool bits with integral cutting edges or with cutting tips brazed or bonded to holder or shank; with square, rectangular, round, and other cross-section shanks; and with single and double end, including flat form and dovetail tools used for turning, planing, boring, shaping, shaving, forming, threading, cutting off, etc.; excluding circular form tools, and all mechanical holding devices and replaceable inserts.

<sup>9</sup>Blanks are cast or formed material, unground, and requiring further processing to make a solid tool or cutting tip. (Does not include components pressed to size, as molded ready-to-use inserts.) Tips are finished or semifinished form of blank to be brazed, soldered, or otherwise bonded to a shank to form a cutting tool. Inserts are replaceable, mechanically-held-cutting-edge components of cutting tools, either pressed to size, or ground on all surfaces (precision ground), or ground on top and bottom only (utility ground).

<sup>10</sup>For 1982, data for product code 35455 96 were not published separately but were included with product codes 35455 93, 35455 83, 35455 97, and 35455 98.

<sup>11</sup>For 1987, data for product codes 35455 81 and 35455 83 are combined to avoid disclosing data for individual companies.

<sup>12</sup>For 1987, data for product codes 35461 23 and 35461 25 are combined with product code 35461 35 to avoid disclosing data for individual companies.

<sup>13</sup>For 1982, data for product codes 35461 12 and 35461 37 were combined with product code 35461 35 to avoid disclosing data for individual companies.

<sup>14</sup>For 1987, data for product code 35462 61 are combined with product code 35462 71 to avoid disclosing data for individual companies.

<sup>15</sup>For 1987, data for product code 35463 11 are combined with product code 35463 12 to avoid disclosing data for individual companies.

<sup>16</sup>For 1982, data for product code 35471 11 were combined with product code 35471 17 to avoid disclosing data for individual companies.

<sup>17</sup>For 1987, data for product code 35473 47 are combined with product code 35473 48 to avoid disclosing data for individual companies.

<sup>18</sup>For 1987, data for product codes 35481 02 and 35481 03 are combined with product code 35481 06 to avoid disclosing data for individual companies.

<sup>19</sup>For 1982, data for product codes 35482 01 and 35482 02 were combined with product code 35482 06 to avoid disclosing data for individual companies.

<sup>20</sup>For 1982, data for product code 35482 12 were combined with product codes 35482 15 and 35482 16 to avoid disclosing data for individual companies. For 1982, data for product codes 35482 07 and 35482 08 were not collected separately but were included with product codes 35482 15 and 35482 16.

<sup>21</sup>For 1987, electron beam welding equipment was reclassified to become part of product code 36997 00, Electronic Systems and Equipment, N.E.C. Data for electron beam welding equipment and induction welding equipment were published combined in 1982. Since these combined data were removed from the 1982 total, that total is not directly comparable to the 1987 total.

<sup>22</sup>For 1987, data for induction welding equipment are included in product code 35485 05. For 1982, they are not included. For explanation, see footnote 21.

<sup>23</sup>For 1982, data for product codes 35480 00 and 35480 02 included only electric welding apparatus. For 1982, data for product codes 35490 00 and 35490 02 included nonelectric welding equipment.

Table 6a-2. Related Products From Current Industrial Reports Series—Value of Shipments by All Producers: 1987 and 1982

[Additional detail is provided in the Current Industrial Report series. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987 product shipments		1982 product shipments	
		Quantity	Value (million dollars)	Quantity	Value (million dollars)
	<b>MQ35W, METALWORKING MACHINERY</b>				
	Metal cutting type machine tools:				
3541D 22	Boring and drilling machines units--	7 708	154.7	(NA)	261.1
3541D 10	All boring machines valued less than \$2,500 each do--	-	-	(D)	(D)
3541D 20	Boring machines valued at \$2,500 each or more: Horizontal boring, drilling, and milling machines, table type units--	29	18.8	77	51.4
3541D 30	Horizontal boring, drilling, and milling machines, floor type units--				
3541D 40	Precision boring machines, including horizontal and vertical boring machines do--	474	84.3	564	109.7
3541D 50	Jig boring machines, horizontal and vertical do--	15	3.8	(D)	(D)
3541D 60	All other boring machines, except boring lathes do--	-	-	(D)	(D)
3541D 05	All drilling machines valued less than \$2,500 each do--	5 865	29.5	15 491	12.0
3541D 15	Drilling machines valued at \$2,500 each or more: Vertical upright drilling machines, including plain, upright and heavy duty units--	423	3.2	1546	6.7
3541D 25	Radial drilling machines, including plain and universal do--	123	9.7	163	5.3
3541D 35	Deep hole drilling machines do--			110	10.4
3541D 45	Multiple spindle drilling machines: Adjustable joint and fixed center types units--	650	18.7	2386	10.7
3541D 55	All other automatic multiple spindle drilling machines do--	129	6.7	272	15.6
3541D 65	All other drilling machines, n.e.c. do--			78	5.2
3541G 22	Gear cutting machines units--	204	59.6	445	86.5
3541G 12	Gear hobsers, horizontal and vertical do--				
3541G 31	Gear shapers, external spur and helical do--	204	59.6	445	86.5
3541G 71	Gear tooth finishing machines do--				
3541G 54	Bevel gear generators do--				
3541G 99	All other gear cutting machines do--				-
3541G 22	Grinding, polishing, buffing, honing, and lapping machines units--	59 897	384.7	58 362	486.7
3541G 10	All grinding, polishing, buffing, honing, and lapping machines valued less than \$2,500 each do--	52 683	13.1	48 651	13.2
	All grinding, polishing, buffing, honing, and lapping machines valued at \$2,500 each or more:				
3541G 11	External cylindrical grinding machines: Plain, including angular wheel types units--	78	20.1	394	68.9
3541G 13	Universal do--	2103	6.6	302	23.7
3541G 15	Roll grinders do--				
3541G 16	Centerless grinders, including shoe type do--	575	76.1	637	93.6
3541G 17	Chuck grinders do--				
3541G 19	All other external cylindrical grinding machines do--				
3541G 23	Internal cylindrical grinding machines, including centerless plain chucking type do--				
3541G 33	Surface grinding machines, rotary table type, horizontal and vertical do--	(D)	(D)	(D)	(D)
3541G 34	Surface grinding machines, reciprocating table type, including face grinders, horizontal and vertical do--	71	16.6	152	21.4
3541G 37	Surface grinding machines, reciprocating table type, including face grinders, hand surface type do--	421	13.3	1 270	35.4
3541G 39	All other surface grinding machines, including planer type do--	878	8.9	1 310	11.2
3541G 44	Disk grinders, double spindle do--				
3541G 46	All other disk grinders, bench, floor, snag grinders, and abrasive belt grinders do--	320	12.1	469	3.5
3541G 52	Tool and cutter grinding machines do--	782	43.5	1 568	31.1
3541G 92	All other grinding machines, n.e.c., including thread grinding machines do--	980	28.7	1 080	42.2
3541G 75	Honing and lapping machines, internal, including combination bore, hone, and external do--	1 129	39.6	1 002	23.0
3541G 79	Flat surface lapping machines, except gear lapping do--	187	8.6	165	4.3
3541G 83	All other honing and lapping machines do--	(D)	(D)	(D)	(D)
3541G 65	Polishing stands, abrasive belt drum and disk do--	333	6.0	(D)	(D)
3541G 69	All other polishing and buffing machines, including speed lathes and multistation type do--	1 061	24.0	650	24.4
3541G 22	Lathes units--	3 045	283.5	4 508	507.3
	Horizontal NC turning machines:				
3541G 15	All lathes (turning machines) valued at \$2,500 each or more:				
	Multiple spindle numerically controlled turning machine units--	-	-		
	Single spindle numerically controlled turning machines:				
3541G 16	Small units--	1 352	120.0	1 295	238.6
3541G 17	Medium do--	96	24.1		
3541G 18	Large do--	82	38.9		
	Vertical numerically controlled turning machines:				
3541G 21	All lathes (turning machines) valued at \$2,500 each or more:				
	Numerically controlled turning machines, vertical spindle:				
3541G 31	Vertical turret lathes and vertical boring machines more than 30 inch diameter table units--	96	42.6	194	94.8
3541G 33	Vertical multiple spindle turning machines do--				
3541G 09	All other vertical spindle turning machines do--				
	Nonnumerically controlled turning machines:				
3541G 14	All lathes (turning machines) valued less than \$2,500 each units--	(D)	(D)	247	.5
3541G 22	All lathes (turning machines) valued at \$2,500 each or more:				
	Horizontal spindle:				
3541G 22	Engine or toolroom lathes, swing over cross slide:				
3541G 22	Up to and including 8 inches units--				
3541G 22	More than 8 inches to 16 inches do--				
3541G 36	More than 16 inches do--	592	12.0	1 531	41.0
3541G 37	All other engine or toolroom lathes do--				

Table 6a-2. Related Products From Current Industrial Reports Series—Value of Shipments by All Producers: 1987 and 1982—Con.

[Additional detail is provided in the Current Industrial Report series. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987 product shipments		1982 product shipments	
		Quantity	Value (million dollars)	Quantity	Value (million dollars)
35415 --	<b>MQ35W, METALWORKING MACHINERY—Con.</b>				
	Metal cutting type machine tools—Con.				
	Lathes—Con.				
	Nonnumerically controlled turning machines—Con.				
	All lathes (turning machines) valued at \$2,500 each or more—Con.				
	Horizontal spindle—Con.				
	Automatic lathes:				
35415 83	Single spindle ----- units -----	(D)	(D)	(NA)	(NA)
	Multiple spindle:				
35415 88	Bar (screw) machines ----- units -----	(D)	(D)	293	40.7
35415 67	Chucking machines ----- do -----	(D)	(D)	54	14.1
35415 57	All other horizontal turning machines (including turret lathes and automatic between center lathes) ----- do -----	311	17.4	(D)	(D)
35415 85	Vertical spindle:				
	Vertical turret lathes and vertical boring machines (VTL and VBM) ----- do -----	(D)	(D)	(D)	(D)
35415 97	All other vertical turning machines, excluding vertical turret lathes and vertical boring machines (VTL and VBM) ----- do -----	(D)	(D)	(D)	(D)
35416 --	Milling machines ----- units -----	6 277	206.9	7 737	265.6
35416 09	All milling machines valued less than \$2,500 each ----- do -----	(D)	(D)	921	.6
	All milling machines valued at \$2,500 or more:				
	General purpose, knee or bed:				
	Horizontal plain, universal, and ram ----- units -----	(D)	(D)		
35416 22	Vertical, except ram ----- do -----	(D)	(D)		
35416 25	Vertical ram ----- do -----	(D)	(D)		
35416 27	All other general purpose type milling machines ----- do -----	(D)	(D)		
35416 29	Automatic and manufacturing, knee or bed:				
35416 31	Single spindle ----- units -----	(D)	(D)	228	21.9
35416 35	Multiple spindle and special purpose machines ----- do -----	437	19.6	429	22.9
35416 53	Profile machines and duplicators ----- do -----				
35416 63	Die sinking and engraving machines, drum type millers, pantograph millers, and cam millers ----- do -----	175	132.2	309	155.7
35416 97	All other milling machines, n.e.c. ----- do -----				
3541A --	Machining centers ----- units -----	1 361	217.9	1 396	357.6
	Drill, mill, and bore (manual tool change):				
3541A 01	Vertical ----- do -----	(D)	(D)		
3541A 03	Horizontal ----- do -----	(D)	(D)	249	33.2
	Drill, mill, and bore, vertical (automatic tool change):				
3541A 05	Y-axis travel less than 20 inches ----- units -----	272	22.7	(D)	
3541A 07	Y-axis travel 20 inches through 26 inches ----- do -----	329	37.2	309	48.1
3541A 09	Y-axis travel more than 26 inches ----- do -----	95	18.5	193	39.8
	Drill, mill, and bore, horizontal (automatic tool change):				
3541A 11	Y-axis travel less than 27 inches ----- units -----	(D)	(D)	237	72.3
3541A 13	Y-axis travel 27 inches through 40 inches ----- do -----	(D)	(D)	166	66.4
3541A 15	Y-axis travel more than 40 inches ----- do -----	84	57.9	107	79.7
3541A 17	Machining center with automatic multiple spindle head changing capability ----- do -----	(D)	(D)	—	—
3541A 19	All other machining centers ----- do -----	(D)	(D)	(D)	(D)
3541B --	Station type machines ----- units -----	434	299.6	792	731.1
3541B 31	Dial or rotary, trunnion, and center column ----- do -----	287	125.3	270	48.0
3541B 33	Way type ----- do -----			54	57.8
3541B 35	Transfer ----- do -----	94	144.6	346	540.4
3541B 37	Other station type, n.e.c. ----- do -----	53	29.6	122	84.9
3541C --	Other metal cutting machine tools ----- units -----	13 785	173.9	39 154	246.2
3541C 41	Other metal cutting machine tools, n.e.c., valued less than \$2,500 ----- do -----	28 020	28.5	29 990	14.8
	Other metal cutting machine tools, n.e.c. valued at \$2,500 each or more:				
3541C 51	Broaching machines ----- units -----	94	11.1	166	38.3
	Sawing and cutoff machines:				
3541C 53	Power hack saws ----- units -----	104	1.3	3562	93.4
3541C 55	Circular cutoff saws (cold) ----- do -----	(D)	(D)	100	5.1
3541C 57	Abrasive wheel saws ----- do -----	(D)	(D)	322	3.5
3541C 59	Band saws ----- do -----	2 904	26.1	24 066	249.6
3541C 61	All other sawing and cutoff machines ----- do -----	558	15.3	1 228	37.1
3541C 63	Tapping machines ----- do -----	(D)	(D)	3373	27.7
3541C 65	Spark erosion, ultrasonic, and electrolytic machines:				
	Electric discharge machine (EDM) other than traveling wire ----- units -----				
3541C 67	Traveling wire EDM ----- do -----	660	24.8	1113	35.8
3541C 69	Electrochemical machines ----- do -----				
3541C 71	All other spark erosion, ultrasonic, and electrolytic machines ----- do -----				
3541C 91	Miscellaneous metal cutting machine tools ----- do -----	758	25.1	1 234	51.0
	Metal forming type machine tools:				
35421 --	Punching, shearing, bending, and forming machines ----- units -----	25 274	315.3	29 738	308.7
35421 08	All punching and shearing machines valued less than \$2,500 each ----- do -----	3 287	4.3	5 996	5.8
	All punching and shearing machines valued at \$2,500 each or more:				
35421 11	Power operated only:				
	Punches, including combination punching and shearing machines ----- units -----	1 684	16.8	1 870	21.4
35421 16	Punching machines fixed position and two axis positioning table ----- do -----	394	61.7	407	45.7
	Plate shearing machines:				
35421 12	Mechanical ----- units -----	2344	131.4	580	38.1
35421 14	Hydraulic ----- do -----	771	13.9	362	17.1
35421 15	Bar, angle, and rotary shearing machines ----- do -----	118	2.5	152	1.8
35421 19	Other power operated punching and shearing machines ----- do -----	207	11.4	365	12.3
35421 33	All bending and forming machines, power operated, valued less than \$2,500 each ----- do -----	11 534	10.8	214 016	210.0

Table 6a-2. Related Products From Current Industrial Reports Series—Value of Shipments by All Producers: 1987 and 1982—Con.

[Additional detail is provided in the Current Industrial Report series. For meaning of abbreviations and symbols, see introductory text]

1987 product code	Product	1987 product shipments		1982 product shipments	
		Quantity	Value (million dollars)	Quantity	Value (million dollars)
<b>MQ35W, METALWORKING MACHINERY—Con.</b>					
35421 --	Metal forming type machine tools—Con.				
	Punching, shearing, bending, and forming machines—Con.				
	All bending and forming machines, power operated, valued at \$2,500 each or more:				
	Press brakes:				
35421 39	Mechanical ----- units	74	13.3	415	7.7
35421 40	Hydraulic ----- do	1657	130.9	612	28.0
35421 41	Hydromechanical ----- do	1134	13.9	262	5.8
35421 37	Bending rolls, sheet, and plate ----- do	360	6.5	262	13.9
35421 35	Bending rolls, angles, bars, shapes, and tubes ----- do	(D)	(D)	116	13.3
35421 43	Rotary bending and forming machines, including rotary head ----- do	2 229	26.1	1 051	24.4
35421 47	Ram and press bending machines ----- do	(D)	(D)	819	11.4
35421 49	Other bending and forming machines, including folders ----- do	2 984	67.6	2 453	52.1
35422 --	Presses, except forgings and die stamping ----- units	8 134	265.6	11 765	344.8
35422 01	All presses valued less than \$2,500 each ----- do	5 585	4.0	8 618	6.5
	All presses valued at \$2,500 each or more:				
	Mechanical presses:				
	Open back inclinable, gap type:				
35422 12	50 tons or less ----- units	423	4.7	433	9.6
35422 02	51 tons to 120 tons ----- do	151	7.3	255	11.0
35422 03	121 tons or more ----- do	59	2.8	(D)	(D)
35422 16	Vertical straight sided and arch frame single action:				
	Single point ----- units	(D)	(D)	(D)	(D)
	Two point:				
35422 17	300 tons or less ----- units	61	15.0	137	43.1
35422 18	301 tons or more ----- do	67	37.3		
35422 42	Gap and horn type ----- do	36	4.0	162	4.5
35422 45	Automatic presses, strip or coil field ----- do	331	52.0	327	47.6
35422 53	All other mechanical presses ----- do	62	76.7	296	103.3
	Hydraulic presses:				
	Vertical single action, all tonnages:				
35422 56	Housing or straight side type ----- units	14	4.3	82	30.0
35422 57	Column type (open rod) ----- do	113	10.8	268	7.3
	Gap or C-frame:				
35422 58	15 tons or less ----- units	472	3.7	450	9.3
35422 59	16 tons to 35 tons ----- do	(D)	(D)		
35422 60	More than 35 tons ----- do	(D)	(D)	99	4.8
35422 73	Vertical double action 2-slide type, all tonnages ----- do	(D)	(D)		
35422 77	Extrusion presses, all types ----- do	(D)	(D)	569	53.8
35422 92	Other hydraulic and pneumatic presses, including horizontal ----- do	594	24.0		
35423 --	All other metal forming type machine tools ----- units	15 001	306.9	6 701	210.0
35423 97	All other metal forming type machine tools valued less than \$2,500 each ----- do	10 424	5.6	1 493	2.4
	All other metal forming type machine tools valued at \$2,500 each or more:				
	Forging machines:				
35423 27	Headers and upsetters ----- units				
35423 31	Swaging machines ----- do	184	42.7	383	79.0
35423 32	Forging presses (die stamping presses) ----- do				
35423 37	All other forging machines ----- do				
35423 43	Thread rolling machinery ----- do	3297	39.7	111	7.2
35423 30	Metal container-making machinery ----- do	1 300	140.0	1 349	44.0
	Die casting machines:				
35423 51	200 tons or less ----- units				
35423 52	201 tons to 500 tons ----- do	180	49.5	106	16.7
35423 53	501 tons to 700 tons ----- do				
35423 54	701 tons or more ----- do				
35423 49	Riveting machines ----- do	1 096	15.3	1 320	14.6
35423 91	All other metal forming type machine tools ----- do	1 520	44.1	1 939	46.1

Note: The percent of estimation of each item is indicated as follows (see "Description of Survey" for a discussion of estimation of missing reports): <sup>1</sup>16 to 25 percent of this item is estimated. <sup>2</sup>26 to 50 percent of this item is estimated. <sup>3</sup>More than 50 percent of this item is estimated.

Table 6b. Product Classes—Value of Shipments by All Producers for Specified States: 1987 and 1982

[Million dollars. Product classes covered are those that are economically significant and whose production is geographically dispersed, provided dispersion is not approximated by data in table 2. Also, product classes are not shown if they are miscellaneous or "not specified by type" classes. Statistics for some States are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 1987. For meaning of abbreviations and symbols, see introductory text. For comparability of product classes and product codes between 1982 and 1987 and explanation of terms, see appendixes]

Product class and geographic area	1987 value of product shipments	1982 value of product shipments	Product class and geographic area	1987 value of product shipments	1982 value of product shipments
<b>3541D, BORING MACHINES AND DRILLING MACHINES</b>			<b>35421, PUNCHING, SHEARING, BENDING, AND FORMING MACHINES</b>		
United States	157.0	266.0	United States	334.4	317.3
Connecticut	21.7	(NA)	California	51.0	23.9
Illinois	19.3	19.1	Connecticut	5.0	2.6
Indiana	5.9	(NA)	Illinois	73.6	70.0
Michigan	76.2	99.1	Michigan	27.2	22.4
Ohio	4.9	(NA)	Minnesota	4.5	(NA)
Wisconsin	15.3	(NA)	Ohio	62.9	57.6
			Wisconsin	5.2	5.3
<b>35414, GRINDING, POLISHING, BUFFING, HONING, AND LAPPING MACHINES</b>			<b>35422, PRESSES, EXCEPT FORGING AND DIE-STAMPING</b>		
United States	396.1	515.3	United States	268.9	369.2
Illinois	43.8	53.4	Illinois	84.0	131.7
Michigan	70.0	48.2	Indiana	4.2	7.9
Minnesota	11.2	12.4	Michigan	37.2	32.6
New York	8.2	10.5	Ohio	58.1	101.4
Ohio	44.6	(NA)	Pennsylvania	21.9	20.8
Pennsylvania	42.0	(NA)			
<b>35415, LATHES</b>			<b>35423, OTHER METAL FORMING MACHINE TOOLS, N.E.C.</b>		
United States	266.5	523.6	United States	307.0	217.0
Connecticut	3.5	68.5	Illinois	46.3	17.1
Michigan	20.2	11.4	Indiana	8.7	(NA)
Ohio	106.2	282.4	Michigan	56.4	19.9
			Ohio	125.8	87.7
<b>35416, MILLING MACHINES</b>			<b>35424, PARTS FOR METAL FORMING MACHINE TOOLS</b>		
United States	197.2	264.5	United States	392.9	380.0
Michigan	11.9	8.0	California	14.8	21.3
Wisconsin	7.6	(NA)	Connecticut	12.4	17.7
			Illinois	80.6	93.1
<b>35418, MACHINE TOOLS HOME WORKSHOPS</b>			Indiana	7.5	6.3
United States	97.2	85.7	Massachusetts	7.5	5.7
Illinois	12.2	10.2	Michigan	58.6	52.9
Massachusetts	3.0	(NA)	New Jersey	13.3	5.7
Michigan	4.8	5.4	New York	26.0	12.3
Minnesota	12.4	(NA)	Ohio	102.4	58.4
			Pennsylvania	10.8	27.6
<b>35419, PARTS FOR METAL CUTTING TYPE MACHINE TOOLS</b>			<b>35441, SPECIAL DIES AND TOOLS, DIE SETS, JIGS, AND FIXTURES</b>		
United States	577.5	891.9	United States	4 219.7	3 425.9
California	6.1	22.5	Alabama	23.8	13.9
Connecticut	37.9	60.1	Arizona	14.6	8.8
Illinois	44.6	85.9	Arkansas	12.8	6.0
Indiana	17.2	16.7	California	247.0	173.2
Massachusetts	20.3	26.2	Colorado	13.6	11.7
			Connecticut	82.3	69.9
Michigan	88.1	165.1	Florida	19.5	26.5
Minnesota	7.4	20.6	Georgia	21.9	15.1
New York	60.4	66.9	Illinois	280.3	247.0
Ohio	138.4	210.8	Indiana	190.8	148.9
Pennsylvania	23.6	40.8	Iowa	26.6	16.4
			Kansas	5.2	3.8
Rhode Island	13.5	15.5	Kentucky	25.8	11.4
South Carolina	6.2	(NA)	Maine	7.1	4.9
Tennessee	2.2	(NA)	Maryland	10.0	9.7
Vermont	15.8	23.6	Massachusetts	57.5	54.1
Wisconsin	35.8	67.7	Michigan	1 541.7	1 248.7
			Minnesota	64.9	45.6
<b>3541A, MACHINING CENTERS</b>			Mississippi	8.1	7.0
United States	231.7	365.7	Missouri	57.6	52.2
New York	19.4	(NA)	Nebraska	3.8	3.0
			New Hampshire	2.8	3.8
<b>3541B, STATION TYPE MACHINES</b>			New Jersey	56.7	67.2
United States	316.4	735.4	New York	158.1	197.7
Michigan	183.8	525.2	North Carolina	19.1	19.3
Ohio	3.9	(NA)	Ohio	650.3	507.7
			Oklahoma	4.3	(NA)
<b>3541C, METAL CUTTING MACHINE TOOLS, N.E.C.</b>			Oregon	2.5	2.4
United States	189.1	250.6	Pennsylvania	331.9	253.5
California	13.0	4.0	Rhode Island	10.4	(NA)
Connecticut	5.6	3.4			
Illinois	23.6	44.0	South Carolina	10.7	8.7
Michigan	45.4	66.9	Tennessee	58.4	31.4
New Jersey	14.0	(NA)	Texas	26.6	30.8
Ohio	34.3	58.8	Virginia	4.5	8.2
Pennsylvania	4.2	12.2	Washington	3.7	2.4
Wisconsin	14.7	6.7	Wisconsin	153.1	95.4

Table 6b. Product Classes—Value of Shipments by All Producers for Specified States: 1987 and 1982—Con.

[Million dollars. Product classes covered are those that are economically significant and whose production is geographically dispersed, provided dispersion is not approximated by data in table 2. Also, product classes are not shown if they are miscellaneous or "not specified by type" classes. Statistics for some States are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 1987. For meaning of abbreviations and symbols, see introductory text. For comparability of product classes and product codes between 1982 and 1987 and explanation of terms, see appendixes.]

Product class and geographic area	1987 value of product shipments	1982 value of product shipments	Product class and geographic area	1987 value of product shipments	1982 value of product shipments
<b>35442, INDUSTRIAL MOLDS AND MOLD BOXES</b>			<b>35455, PRECISION MEASURING TOOLS</b>		
United States	2 523.2	1 800.6	United States	440.9	402.7
Alabama	19.0	5.9	California	11.9	15.2
Arizona	14.1	11.0	Connecticut	16.7	16.9
Arkansas	5.0	3.8	Illinois	11.3	5.6
California	213.8	145.9	Indiana	5.8	6.4
Colorado	12.3	5.6	Michigan	98.2	101.1
Connecticut	53.2	41.1	New York	68.9	32.0
Florida	35.8	25.0	Ohio	74.2	63.8
Georgia	16.5	5.5			
Illinois	290.3	232.1			
Indiana	121.0	94.3			
Iowa	7.0	6.8			
Kansas	6.9	.5			
Kentucky	9.9	7.6			
Maine	2.9	3.1			
Massachusetts	73.9	76.5			
Michigan	514.2	314.6	<b>35462, POWER-DRIVEN HANDTOOLS, PNEUMATIC, HYDRAULIC, AND POWDER-ACTUATED</b>		
Minnesota	79.7	46.6	United States	508.5	382.4
Mississippi	2.1	(NA)			
Missouri	56.1	35.8			
Nebraska	2.3	(NA)			
New Hampshire	10.3	11.0	California	22.0	17.6
New Jersey	125.7	110.2	New York	63.3	(NA)
New York	65.1	70.7	Ohio	125.1	70.0
North Carolina	22.3	16.8			
Ohio	343.2	246.5			
Oregon	6.9	4.5	<b>35472, COLD ROLLING MILL MACHINERY</b>		
Pennsylvania	188.2	147.3	United States	67.2	65.1
Rhode Island	5.4	4.8			
South Carolina	10.9	6.6	Connecticut	15.4	(NA)
Tennessee	11.4	7.5	Ohio	7.7	(NA)
Texas	21.5	21.7			
Utah	2.2	(NA)	<b>35473, ROLLING MILL MACHINERY, N.E.C., AND PARTS</b>		
Vermont	3.5	(NA)	United States	137.3	188.2
Virginia	6.2	2.2			
Washington	12.4	5.7	Illinois	9.6	12.2
Wisconsin	145.6	66.3	Ohio	65.8	48.3
			Pennsylvania	15.9	58.3
<b>35451, SMALL CUTTING TOOLS FOR MACHINE TOOLS AND METALWORKING MACHINERY</b>					
United States	1 880.8	1 755.7	<b>35481, ARC WELDING MACHINES, COMPONENTS, AND ACCESSORIES</b>		
Alabama	27.0	27.0	United States	609.9	511.6
Arizona	4.9	(NA)			
California	61.8	57.5	California	33.1	17.5
Connecticut	46.2	45.1	Illinois	33.5	28.4
Florida	18.3	15.9	Michigan	102.4	31.6
Georgia	36.9	35.9	Missouri	10.7	(NA)
Illinois	176.7	162.3			
Indiana	31.3	22.3	<b>35482, ARC WELDING ELECTRODES, METAL</b>		
Iowa	11.3	10.1	United States	494.4	469.6
Kentucky	9.3	6.9			
Massachusetts	87.1	141.0	Ohio	291.7	233.5
Michigan	362.7	414.3			
New Jersey	49.8	50.4	<b>35483, RESISTANCE WELDERS, COMPONENTS, ACCESSORIES, AND ELECTRODES</b>		
New York	43.0	72.4	United States	303.6	187.8
North Carolina	74.6	39.3			
Ohio	304.1	255.7	Illinois	16.8	10.2
Pennsylvania	121.1	82.1	Michigan	216.5	121.8
Rhode Island	15.6	19.1	New Jersey	9.6	4.9
South Carolina	125.6	73.1	Ohio	29.6	14.1
Tennessee	56.5	(NA)			
Texas	18.8	15.8	<b>35484, GAS WELDING AND CUTTING EQUIPMENT</b>		
Vermont	49.3	41.7	United States	205.3	226.6
Wisconsin	81.5	49.2			
			California	5.5	8.8
<b>35454, MACHINE TOOL ATTACHMENTS AND ACCESSORIES, N.E.C.</b>			Pennsylvania	11.1	13.1
United States	542.6	593.6			
California	15.5	19.9	<b>35485, OTHER WELDING EQUIPMENT, EXCEPT ULTRASONIC AND LASER</b>		
Connecticut	50.3	58.1	United States	182.6	148.4
Illinois	26.9	49.9			
Indiana	11.7	16.3	California	4.8	(NA)
Massachusetts	16.9	8.1	Illinois	14.6	(NA)
Michigan	110.4	148.5	Michigan	5.6	(NA)
New Jersey	11.7	9.0	Ohio	22.4	(NA)
New York	35.1	30.2			
Ohio	92.5	85.7			
Pennsylvania	12.5	36.2			
Rhode Island	8.1	(NA)			
Wisconsin	24.9	13.8			

## Table 6b. Product Classes—Value of Shipments by All Producers for Specified States: 1987 and 1982—Con.

[Million dollars. Product classes covered are those that are economically significant and whose production is geographically dispersed, provided dispersion is not approximated by data in table 2. Also, product classes are not shown if they are miscellaneous or "not specified by type" classes. Statistics for some States are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 1987. For meaning of abbreviations and symbols, see introductory text. For comparability of product classes and product codes between 1982 and 1987 and explanation of terms, see appendixes]

Product class and geographic area	1987 value of product shipments	1982 value of product shipments	Product class and geographic area	1987 value of product shipments	1982 value of product shipments
<b>35492, ASSEMBLY MACHINES</b>			<b>35492, ASSEMBLY MACHINES—Con.</b>		
United States -----	527.3	367.6	Pennsylvania -----	20.8	(NA)
California -----	4.8	2.7			
Connecticut -----	36.0	12.2			
Illinois -----	43.8	22.7			
Indiana -----	25.0	16.1			
Massachusetts -----	10.1	(NA)			
Michigan -----	228.3	168.9			
Minnesota -----	14.6	5.2			
New York -----	35.7	(NA)			
Ohio -----	40.1	24.6			

<sup>1</sup>For 1982, data for product class 35485 excluded induction welding equipment.

## Table 6c. Historical Statistics for Product Classes—Value Shipped by All Producers: 1987 and Earlier Years

[Million dollars. For meaning of abbreviations and symbols, see introductory text. For comparability of product classes and product codes between 1982 and 1987 and explanation of terms, see appendixes]

1987 product code	Product class	1987	1986 <sup>1</sup>	1985 <sup>1</sup>	1984 <sup>1</sup>	1983 <sup>1</sup>	1982	1977	1972
3541- 3541D	<b>Machine tools, metal cutting types</b> ----- Boring machines and drilling machines -----	<b>2 585.2</b> 157.0	<b>2 939.7</b> 129.7	<b>2 920.7</b> 135.9	<b>2 815.0</b> 142.8	<b>2 544.9</b> 139.4	<b>4 154.7</b> 266.0	<b>2 560.5</b> 202.4	<b>1 258.5</b> 132.4
35413	Gear cutting machines -----	62.4	57.8	55.6	41.6	40.3	87.3	67.1	56.7
35414	Grinding, polishing, buffing, honing, and lapping machines -----	396.1	412.4	412.4	378.3	331.6	515.3	288.3	168.6
35415	Lathes -----	266.5	265.3	313.0	300.6	306.5	523.6	455.9	197.6
35416	Milling machines -----	197.2	154.0	185.5	184.6	145.4	264.5	167.8	86.6
35418	Machining tools home workshops -----	97.2	96.9	121.0	94.9	71.9	85.7	66.3	2303.1
35419	Parts for metal cutting type machine tools -----	577.5	740.1	732.4	794.6	694.6	891.9	502.1	242.1
3541A	Machining centers -----	231.7	227.8	230.9	215.3	184.5	365.7	(2)	
3541B	Station type machines -----	316.4	516.1	388.3	330.3	271.9	735.4	(2)	
3541C	Metal cutting machine tools, n.e.c. -----	189.1	137.9	158.7	162.2	181.4	250.6	647.3	(2)
35410	Machine tools, metal cutting types, n.s.k. -----	94.2	201.8	186.1	169.8	177.5	168.7	163.3	71.4
3542- 35421	<b>Machine tools, metal forming types</b> ----- Punching, shearing, bending, and forming machines -----	<b>1 370.3</b> 334.4	<b>1 429.5</b> 303.3	<b>1 432.5</b> 376.1	<b>1 362.6</b> 355.4	<b>1 119.2</b> 242.3	<b>1 383.9</b> 317.3	<b>1 114.7</b> 280.1	<b>670.1</b> 153.4
35422	Presses, except forging and die-stamping -----	268.9	306.6	281.5	247.7	176.5	369.2	282.6	183.2
35423	Other metal forming machine tools, n.e.c. -----	307.0	219.5	200.1	178.4	168.9	217.0	171.7	149.0
35424	Parts for metal forming machine tools -----	392.9	505.8	480.2	482.7	430.7	380.0	295.5	161.5
35420	Machine tools, metal forming types, n.s.k. -----	67.3	94.2	94.7	98.4	100.8	100.5	85.0	23.0
3543- 35430	<b>Industrial patterns</b> ----- Industrial patterns, except shoe patterns -----	<b>557.9</b> 557.9	<b>601.8</b> 601.8	<b>573.4</b> 573.4	<b>510.4</b> 510.4	<b>493.6</b> 493.6	<b>561.5</b> 561.5	<b>411.9</b> 411.9	<b>234.4</b> 234.4
3544- 35441	<b>Special dies, tools, jigs, and fixtures</b> ----- Special dies and tools, die sets, jigs, and fixtures -----	<b>8 142.8</b> 4 219.7	<b>8 567.8</b> 5 090.3	<b>8 143.8</b> 4 745.1	<b>7 561.4</b> 4 343.5	<b>6 113.3</b> 3 410.2	<b>6 099.3</b> 3 425.9	<b>4 450.2</b> 2 578.0	<b>2 713.5</b> 1 520.1
35442	Industrial molds and mold boxes -----	2 523.2	2 449.1	2 491.3	2 248.3	1 817.5	1 800.6	1 040.0	640.3
35440	Special dies, tools, jigs, and fixtures, n.s.k. -----	1 399.9	1 028.3	907.3	969.6	885.6	872.8	832.2	553.1
3545- 35451	<b>Machine tool accessories</b> ----- Small cutting tools for machine tools and metalworking machinery -----	<b>3 417.8</b> 1 880.8	<b>33 464.4</b> 2 053.8	<b>3 506.0</b> 2 030.8	<b>3 376.8</b> 1 982.0	<b>2 652.4</b> 1 485.3	<b>3 069.1</b> 1 755.7	<b>2 238.9</b> 1 376.4	<b>1 151.4</b> 738.0
35454	Machine tool attachments and accessories, n.e.c. -----	542.6	770.4	793.2	670.7	524.6	593.6	430.9	218.8
35455	Precision measuring tools -----	440.9	466.4	487.7	456.7	343.8	402.7	208.2	94.7
35450	Machine tool accessories, n.s.k. -----	553.6	173.9	194.3	267.4	298.7	317.0	223.5	99.9
3546- 35461	<b>Power-driven handtools</b> ----- Power-driven handtools, electric (including battery-powered) -----	<b>1 886.1</b> 1 061.9	<b>1 924.4</b> 1 036.5	<b>1 895.4</b> 988.8	<b>1 824.1</b> 906.5	<b>1 591.3</b> 829.6	<b>1 594.8</b> 829.6	<b>1 496.5</b> 748.7	<b>4725.0</b> 386.9
35462	Power-driven handtools, pneumatic, hydraulic, and powder-actuated -----	508.5	544.3	524.4	485.3	389.6	382.4	371.1	320.0
35463	Power-driven handtools, engine (internal combustion) driven -----	213.7	269.7	300.1	350.1	318.2	326.5	347.1	
35460	Power-driven handtools, n.s.k. -----	101.9	73.9	82.1	54.0	56.0	29.6	18.1	
3547- 35471	<b>Rolling mill machinery</b> ----- Hot rolling mill machinery (except tube rolling) -----	<b>403.0</b> 175.3	<b>263.9</b> 95.5	<b>351.5</b> 144.2	<b>273.0</b> 84.7	<b>339.9</b> 147.1	<b>445.1</b> 180.5	<b>361.0</b> 147.0	<b>247.9</b> 134.7
35472	Cold rolling mill machinery -----	67.2	54.2	66.9	65.4	73.4	65.1	74.9	52.4
35473	Rolling mill machinery, n.e.c., and parts -----	137.3	102.8	131.2	109.7	107.0	188.2	120.8	55.6
35470	Rolling mill machinery, n.s.k. -----	23.2	11.3	9.2	13.3	12.4	11.4	18.3	5.2
3548- 35481	<b>Welding apparatus</b> ----- Arc welding machines, components, and accessories -----	<b>1 918.0</b> 609.9	<b>(NA)</b> 515.3	<b>(NA)</b> 575.2	<b>(NA)</b> 543.1	<b>(NA)</b> 446.6	<b>1 606.6</b> 511.6	<b>(NA)</b> 407.8	<b>(NA)</b> 218.5
35482	Arc welding electrodes, metal -----	494.4	508.3	505.5	510.2	398.9	469.6	447.6	215.5
35483	Resistance welders, components, accessories, and electrodes -----	303.6	333.8	295.5	210.8	168.9	187.8	136.9	115.1
35484	Gas welding and cutting equipment -----	205.3	219.4	240.5	230.6	223.8	(NA)	(NA)	(NA)
35485	Other welding equipment, except ultrasonic and laser -----	182.6	(NA)	(NA)	(NA)	(NA)	\$148.4	(NA)	(NA)
35480	Welding apparatus, n.s.k. -----	122.1	(NA)	(NA)	(NA)	(NA)	\$62.7	(NA)	(NA)
3549- 35492	<b>Metalworking machinery, n.e.c.</b> ----- Assembly machines -----	<b>1 026.1</b> 527.3	<b>(NA)</b> 530.9	<b>(NA)</b> 465.5	<b>(NA)</b> 397.0	<b>(NA)</b> 242.7	<b>780.2</b> 367.6	<b>(NA)</b> 128.4	<b>(NA)</b> (NA)
35495	Metalworking machinery, n.e.c. -----	336.9	(NA)	(NA)	(NA)	(NA)	313.0	(NA)	(NA)
35490	Metalworking machinery, n.e.c., n.s.k. -----	161.8	(NA)	(NA)	(NA)	(NA)	799.6	(NA)	(NA)

See footnotes at end of table.

Table 6c. Historical Statistics for Product Classes—Value Shipped by All Producers: 1987 and Earlier Years—Con.

<sup>1</sup>Figures are estimates derived from a representative sample of manufacturing establishments. Standard errors associated with estimates are published in annual survey of manufacturers publications for this period.  
<sup>2</sup>For 1972, data for product classes 3541A, 3541B, and 3541C were included with product class 3541A.  
<sup>3</sup>For 1986 and prior years, data for product classes 35451, 35454, and 35455 were collected and published as product classes 35451, 35453, and 35452 respectively.  
<sup>4</sup>Prior to 1977, chain saws and parts were classified in Industry 3553. For 1977 and later years, chain saws and parts are classified in Industry 3546. Before 1977, hydraulic and internal combustion engine driven handtools and parts (excluding chain saws and parts) were classified in Industry 3546, but not collected separately.  
<sup>5</sup>For 1982, data for product class 35485 excluded induction welding equipment.  
<sup>6</sup>For 1982, data for product class 35480 included only electric welding apparatus.  
<sup>7</sup>For 1982, data for product class 35490 included nonelectric welding equipment.

Table 7. Materials Consumed by Kind: 1987 and 1982

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
<b>INDUSTRY 3541, MACHINE TOOLS, METAL CUTTING TYPES</b>					
	Materials, parts, containers, and supplies	(X)	1 151.4	(X)	1 380.0
	Mill shapes and forms, except castings and forgings:				
331011	Carbon steel:				
331012	Bars and bar shapes	1,000 s tons	(S)	17.3	(S)
331013	Sheet and strip	do	(S)	8.9	(S)
331014	Plates	do	(S)	6.3	(S)
331015	Structural shapes	do	(S)	1.9	(S)
331017	Wire and wire products	do	(S)	11.7	(S)
331019	All other carbon steel mill shapes and forms	do			3.2
331021	Alloy steel, except stainless:				
331022	Bars and bar shapes	1,000 s tons	(S)	6.1	(S)
331023	All other alloy steel mill shapes and forms	do	(S)	2.8	(S)
331024	Stainless steel	do	(S)	.9	(S)
335004	Copper and copper-base alloy	mil lb	(S)	.3	(S)
335301	Aluminum and aluminum-base alloy:				
335405	Sheet, plate, and foil	mil lb	(S)	1.8	(S)
335406	Extruded shapes, including extruded rod, bar, pipe, tube, etc.	do	(S)	1.3	(S)
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.)	do	(S)	.6	(S)
335609	Nonferrous metal mill shapes and forms (except copper and aluminum)	do	(S)	.2	(S)
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content)	do	(S)	3.4	(S)
329101	Grinding wheels and other abrasive products, except industrial diamonds				
190023	Iron and steel scrap, excluding home scrap	1,000 s tons	(S)	5.5	(X)
				2.1	(S)
	Castings (rough and semifinished):				
332011	Iron (gray and malleable)	1,000 s tons	(S)	42.7	(S)
332045	Steel	do	(S)	12.6	(S)
336005	Aluminum and aluminum-base alloy	mil lb	(S)	2.9	(S)
336006	Copper and copper-base alloy	do	(S)	.5	(S)
336008	Other nonferrous	do	(S)	1.3	(D)
346200	Iron and steel forgings	1,000 s tons	(S)	2.7	(S)
349271	Fluid power (hydraulic and pneumatic) valves		(X)	10.3	(X)
349261	Fluid power (hydraulic and pneumatic) hose or tube fittings and assemblies		(X)	3.4	(X)
	Electric motors and generators:				
362110	Fractional horsepower electric motors (less than 1 hp):				
362115	Timing motors, synchronous and subsynchronous	thousands	(S)	22.6	(S)
362120	Other fractional horsepower electric motors (less than 1 hp) (excluding timing motors)	do	(S)	9.5	(S)
	Integral horsepower motors and generators (1 hp and larger)	do	(S)	24.5	(S)
	Bearings, including mounted and unmounted:				
356218	Ball		(X)	12.8	(X)
356201	Roller		(X)	4.1	(X)
356601	Speed changers, gears, and industrial high-speed drives		(X)	3.7	(X)
	Pumps (complete assemblies):				
359412	Hydraulic fluid power pumps, motors, and hydrostatic transmissions	thousands	(S)	7.3	(S)
356102	Other pumps	do	(S)	1.6	(S)
356301	Air and gas compressors	do	(S)	.5	(S)
356921	Filters for hydraulic fluid power systems		(X)	2.1	(X)
359301	Fluid power (hydraulic and pneumatic) cylinders and rotary actuators		(X)	3.4	(X)
359302	Hydraulic and pneumatic equipment (except pumps, compressors, cylinders, and rotary actuators)		(X)	4.0	(X)
360101	Electric transmission, distribution, and control equipment		(X)	24.2	(X)
265001	Paperboard containers, boxes, and corrugated paperboard	1,000 s tons	(S)	1.1	(S)
305201	Rubber and plastics hose and belting		(X)	2.2	(X)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products		(X)	8.9	(X)
354501	Cutting tools for machine tools		(X)	13.9	(X)
362001	Electrical industrial capacitors, resistors, rheostats, and coil windings		(X)	11.1	(X)
362520	Numerical controls for metalworking machinery (except programmable)		(X)	35.6	(X)
362521	Programmable controllers for metalworking machinery		(X)	28.7	(X)
970099	All other materials and components, parts, containers, and supplies		(X)	395.3	(X)
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup>		(X)	386.8	(X)

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
<b>INDUSTRY 3542, MACHINE TOOLS, METAL FORMING TYPES</b>					
	Materials, parts, containers, and supplies	(X)	542.9	(X)	512.8
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes	1,000 s tons	(S)	11.3	(S)
331012	Sheet and strip	do	(S)	2.8	(S)
331013	Plates	do	(S)	21.0	**52.5
331015	Structural shapes	do	(S)	3.2	(S)
331017	Wire and wire products	do	(S)	.3	(S)
331019	All other carbon steel mill shapes and forms	do	(S)	4.5	(S)
	Alloy steel, except stainless:				
331021	Bars and bar shapes	1,000 s tons	(S)	2.9	(S)
331029	All other alloy steel mill shapes and forms	do	(S)	2.6	(S)
331031	Stainless steel	do	(S)	.7	(S)
335004	Copper and copper-base alloy	mil lb	**.9	1.9	(S)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil	mil lb	(S)	2.5	(S)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc.	do	(S)	1.5	(S)
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.)	do	(S)	.3	(Z)
335609	Nonferrous metal mill shapes and forms, except copper and aluminum	do	(S)	.1	(D)
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content)	do	(S)	2.0	(S)
329101	Grinding wheels and other abrasive products, except industrial diamonds		(X)	1.7	(X)
190023	Iron and steel scrap, excluding home scrap	1,000 s tons	(S)	.9	(S)
	Castings (rough and semifinished):				
332011	Iron (gray and malleable)	1,000 s tons	(S)	17.3	(S)
332045	Steel	do	(S)	6.7	(S)
336005	Aluminum and aluminum-base alloy	mil lb	(S)	.8	(S)
336006	Copper and copper-base alloy	do	(S)	1.8	(S)
336008	Other nonferrous	do	(S)	.2	(S)
346200	Iron and steel forgings	1,000 s tons	(S)	5.4	(S)
349271	Fluid power (hydraulic and pneumatic) valves		(X)	5.1	(X)
349261	Fluid power (hydraulic and pneumatic) hose or tube fittings and assemblies		(X)	4.3	(X)
	Electric motors and generators:				
362110	Fractional horsepower electric motors (less than 1 hp):				
362115	Timing motors, synchronous and subsynchronous	thousands	(S)	3.4	(S)
	Other fractional horsepower electric motors (less than 1 hp) (excluding timing motors)	do	(S)	.5	(S)
362120	Integral horsepower motors and generators (1 hp and larger)	do	(S)	9.1	(S)
	Bearings, including mounted and unmounted:				
356218	Ball		(X)	4.2	(X)
356201	Roller		(X)	4.7	(X)
356601	Speed changers, gears, and industrial high-speed drives		(X)	4.8	(X)
	Pumps (complete assemblies):				
359412	Hydraulic fluid power pumps, motors, and hydrostatic transmissions	thousands	(S)	7.9	(S)
356102	Other pumps	do	(S)	.9	(S)
356301	Air and gas compressors	do	(S)	.5	(D)
356921	Filters for hydraulic fluid power systems		(X)	.2	(X)
359301	Fluid power (hydraulic and pneumatic) cylinders and rotary actuators		(X)	9.3	(X)
359302	Hydraulic and pneumatic equipment (except pumps, compressors, cylinders, and rotary actuators)		(X)	3.8	(X)
360101	Electric transmission, distribution, and control equipment		(X)	9.5	(X)
265001	Paperboard containers, boxes, and corrugated paperboard	1,000 s tons	(S)	.7	(S)
305201	Rubber and plastics hose and belting		(X)	1.7	(X)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products		(X)	5.8	(X)
354501	Cutting tools for machine tools		(X)	6.1	(X)
362001	Electrical industrial capacitors, resistors, rheostats, and coil windings		(X)	6.1	(X)
362520	Numerical controls for metalworking machinery (except programmable)		(X)	1.7	(X)
362521	Programmable controllers for metalworking machinery		(X)	10.5	(X)
970099	All other materials and components, parts, containers, and supplies		(X)	106.1	(X)
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup>		(X)	243.6	(X)
<b>INDUSTRY 3543, INDUSTRIAL PATTERNS</b>					
	Materials, parts, containers, and supplies	(X)	91.4	(X)	74.1
	Mill shapes and forms, except castings and forgings:				
331001	Carbon steel	1,000 s tons	(S)	.7	(S)
331020	Alloy steel, except stainless	do	(S)	.4	*1.0
331031	Stainless steel	do	(S)	.2	**.5
335105	Copper and copper-base alloy	mil lb	(Z)	(Z)	.9
335001	Aluminum and aluminum-base alloy	do	(S)	1.1	**2.2
	Castings (rough and semifinished):				
332011	Iron (gray and malleable)	1,000 s tons	(S)	4.8	(S)
332045	Steel	do	(S)	1.6	(S)
336005	Aluminum and aluminum-base alloy	mil lb	(S)	2.0	(S)
336006	Copper and copper-based alloy	do	(S)	.1	**1.0
336008	Other nonferrous	do	(S)	.1	2.2
242101	Rough and dressed lumber	1,000 bd ft	(S)	1.5	**8.9

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text.]

1987 material code	Material	1987		1982	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
<b>INDUSTRY 3543, INDUSTRIAL PATTERNS—Con.</b>					
308007	Plastics products consumed in the form of sheets, rods, tubes, and other shapes.....	(X)	.8	(X)	3.1
970099	All other materials and components, parts, containers, and supplies consumed.....	(X)	20.5	(X)	8.4
971000	Materials, parts, containers, supplies, n.s.k. <sup>2</sup> .....	(X)	57.6	(X)	33.3
<b>INDUSTRY 3544, SPECIAL DIES, TOOLS, JIGS, AND FIXTURES</b>					
	<b>Materials, parts, containers, and supplies</b> .....	(X)	1 638.1	(X)	1 131.6
Mill shapes and forms, except castings and forgings:					
Carbon steel:					
331011	Bars and bar shapes..... 1,000 s tons.....	(S)	75.4	(S)	52.3
331012	Sheet and strip..... do.....	(S)	31.7	(S)	17.0
331013	Plates..... do.....	(S)	42.1	(S)	48.1
331015	Structural shapes..... do.....	(S)	6.0	(S)	7.3
331017	Wire and wire products..... do.....	(S)	1.1	(S)	.4
331019	All other carbon steel mill shapes and forms..... do.....	(S)	16.2	(S)	9.0
Alloy steel, except stainless:					
331021	Bars and bar shapes..... 1,000 s tons.....	(S)	88.7	(S)	60.5
331029	All other alloy steel mill shapes and forms..... do.....	(S)	39.1	(S)	18.6
Stainless steel:					
331033	Sheet and strip..... 1,000 s tons.....	(S)	6.3	(S)	5.0
331050	All other stainless steel mill shapes and forms..... do.....	(S)	17.7	(S)	7.4
Copper and copper-base alloy:					
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes..... mil lb.....	(S)	2.5	(S)	1.9
335143	Plate, sheet, and strip, including military cups and discs..... do.....	(S)	6.3	(S)	4.8
335003	All other..... do.....	(S)	.3	(S)	.8
Aluminum and aluminum-base alloy:					
335301	Sheet, plate, and foil..... mil lb.....	(S)	13.8	(S)	7.7
335405	Extruded shapes, including rod, bar, pipe, tube, etc..... do.....	(S)	5.7	(S)	3.4
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.)..... do.....	(S)	2.4	(S)	1.1
335609	Nonferrous metal mill shapes and forms, except copper and aluminum..... carats.....	(X)	1.3	(X)	.9
329903	Industrial diamonds..... carats.....	(S)	4.6	(S)	3.0
Metal powders:					
339916	Tungsten carbide..... mil lb.....	(S)	14.7	(S)	14.7
339919	All other..... do.....	*+.3	3.0	*+.5	3.3
190023	Iron and steel scrap, excluding home scrap..... 1,000 s tons.....	(S)	15.0	**3.8	1.2
Castings (rough and semifinished):					
332011	Iron (gray and malleable)..... 1,000 s tons.....	(S)	17.8	(S)	28.0
332045	Steel..... do.....	(S)	10.9	(S)	7.9
336005	Aluminum and aluminum-base alloy..... mil lb.....	(S)	5.8	(S)	4.9
336006	Copper and copper-base alloy..... do.....	(S)	7.8	(S)	4.0
336008	Other nonferrous..... do.....	(S)	28.0	(S)	2.7
346200	Iron and steel forgings..... 1,000 s tons.....	(S)	2.9	**1.4	2.4
Bearings, including mounted and unmounted:					
356218	Ball.....	(X)	1.8	(X)	.7
356201	Roller.....	(X)	.9	(X)	.4
359411	Hydraulic and pneumatic equipment, including pumps and compressors.....	(X)	8.6	(X)	4.7
360101	Electric transmission, distribution, and control equipment.....	(X)	17.2	(X)	2.9
329101	Grinding wheels and other abrasive products, except industrial diamonds.....	(X)	12.4	(X)	9.0
345001	Bolts, nuts, screws, washers, rivets, and screw machine products.....	(X)	24.2	(X)	10.1
280020	Ceramic raw materials, including powders, chemicals, and fibers, excluding refractory uses.....	(X)	1.3	(X)	(5)
320601	Ceramic and ceramic composite parts, components, and accessories.....	(X)	.5	(X)	(5)
970099	All other materials and components, parts, containers, and supplies.....	(X)	304.7	(X)	5206.2
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup> .....	(X)	799.4	(X)	579.3
<b>INDUSTRY 3545, MACHINE TOOL ACCESSORIES</b>					
	<b>Materials, parts, containers, and supplies</b> .....	(X)	800.6	(X)	778.8
Mill shapes and forms, except castings and forgings:					
Carbon steel:					
331011	Bars and bar shapes..... 1,000 s tons.....	(S)	52.0	(S)	37.1
331012	Sheet and strip..... do.....	(S)	1.5	(S)	1.5
331013	Plates..... do.....	(S)	2.4	(S)	3.7
331015	Structural shapes..... do.....	(S)	1.3	(S)	1.5
331017	Wire and wire products..... do.....	(S)	4.3	(S)	4.7
331019	All other carbon steel mill shapes and forms..... do.....	(S)	6.9	(S)	10.1
Alloy steel, except stainless:					
331021	Bars and bar shapes..... 1,000 s tons.....	(S)	105.1	(S)	119.4
331029	All other alloy steel mill shapes and forms..... do.....	(S)	14.1	(S)	20.1
Stainless steel:					
331033	Sheet and strip..... 1,000 s tons.....	(S)	3.9	*.7	1.8
331050	All other stainless steel mill shapes and forms..... do.....	(S)	3.6	(S)	4.9
Copper and copper-base alloy:					
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes..... mil lb.....	(S)	.8	(S)	.4
335143	Plate, sheet, and strip, including military cups and discs..... do.....	(D)	.2	(S)	.3
335003	All other..... do.....	(S)	.2	4.1	4.3

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
	<b>INDUSTRY 3545, MACHINE TOOL ACCESSORIES</b> —Con.				
	Mill shapes and forms, except castings and forgings—Con. Aluminum and aluminum-base alloy: Sheet, plate, and foil ----- mil lb--	(S)	.7	(S)	.6
335301	Extruded shapes, including rod, bar, pipe, tube, etc. ----- do--	(S)	.7	(S)	.9
335405	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ----- do--	(S)	1.6	(S)	.2
335008					
335609	Nonferrous metal mill shapes and forms, except copper and aluminum -----	(X)	.8	(S)	2.7
329903	Industrial diamonds ----- carats--	(S)	14.2	(S)	9.2
	Metal powders: Tungsten carbide ----- mil lb--	(S)	100.5	(S)	107.5
339916	All other ----- do--	(S)	7.1	(S)	17.3
339919	Iron and steel scrap, excluding home scrap----- 1,000 s tons--	(S)	1.8	(S)	.1
190023					
	Castings (rough and semifinished): Iron (gray and malleable) ----- 1,000 s tons--	(S)	6.9	(S)	10.8
332011	Steel ----- do--	(S)	4.6	(S)	4.0
332045	Aluminum and aluminum-base alloy ----- mil lb--	(S)	1.4	(S)	2.3
336005	Copper and copper-base alloy ----- do--	(S)	.2	(S)	.2
336006	Other nonferrous ----- do--	(S)	(Z)	(S)	.5
336008	Iron and steel forgings ----- 1,000 s tons--	(S)	1.5	(S)	1.6
346200					
	Bearings, including mounted and unmounted: Ball -----	(X)	4.7	(X)	2.6
356218	Roller -----	(X)	1.7	(X)	1.1
356201					
359411	Hydraulic and pneumatic equipment, including pumps and compressors -----	(X)	4.9	(X)	2.6
360101	Electric transmission, distribution, and control equipment-----	(X)	30.4	(X)	5.3
329101	Grinding wheels and other abrasive products, except industrial diamonds -----	(X)	34.0	(X)	19.2
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	(X)	5.9	(X)	7.0
280020	Ceramic raw materials, including powders, chemicals, and fibers, excluding refractory uses -----	(X)	1.5	(X)	(5)
320601	Ceramic and ceramic composite parts, components, and accessories -----	(X)	(D)	(X)	(5)
970099	All other materials and components, parts, containers, and supplies -----	(X)	171.2	(X)	5182.9
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup> -----	(X)	203.2	(X)	194.4
	<b>INDUSTRY 3546, POWER-DRIVEN HANDTOOLS</b>				
	Materials, parts, containers, and supplies -----	(X)	846.6	(X)	652.3
	Mill shapes and forms, except castings and forgings: Carbon steel: Bars and bar shapes ----- 1,000 s tons--	(S)	13.0	14.5	19.9
331011	Sheet and strip ----- do--	(S)	9.3	(S)	34.6
331012	All other carbon steel mill shapes and forms----- do--				
331006					
	Alloy steel, except stainless: Bars and bar shapes ----- 1,000 s tons--	(S)	10.7	(S)	9.1
331021	All other alloy steel mill shapes and forms ----- do--				5.8
331029					
335609	Nonferrous metal mill shapes and forms, except copper and aluminum ----- do--	(D)	(D)	(S)	1.0
335770	Magnet wire ----- mil lb--	*9.4	13.8	*7.2	10.1
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content) ----- do--	*3.2	11.3	(S)	6.8
	Castings (rough and semifinished): Iron (gray and malleable) ----- 1,000 s tons--	(S)	1.4	(S)	3.4
332011	Steel ----- do--	**1.4	14.3	(S)	6.0
332045	Aluminum and aluminum-base alloy ----- mil lb--	(S)	51.2	(S)	39.9
336005	Other nonferrous ----- do--	(S)	.1	(D)	69.5
336003	Iron and steel forgings ----- 1,000 s tons--	(D)	(D)	**3.4	4.0
346200					
	Electric motors and generators: Fractional horsepower electric motors (less than 1 hp) (excluding timing motors) ----- thousands--	(S)	10.3	5 089.7	7.0
362115	Integral horsepower motors and generators (1 hp and larger) ----- do--	(D)	(D)	(D)	(5)
362120					
	Bearings, including mounted and unmounted: Ball -----	(X)	15.3	(X)	19.0
356218	Roller -----	(X)	3.5	(X)	3.6
356201					10.2
356601	Speed changers, gears, and industrial high-speed drives-----	(X)	8.8	(X)	
359411	Hydraulic and pneumatic equipment, including pumps and compressors -----	(X)	(D)	(X)	1.8
308006	Fabricated plastics products (except gaskets) -----	(X)	41.8	(X)	35.4
345001	Bolts, nuts, screws, fasteners, washers, rivets, and screw machines -----	(X)	31.7	(X)	18.6
970099	All other materials and components, parts, containers, and supplies -----	(X)	441.9	(X)	3482.2
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup> -----	(X)	151.1	(X)	58.4

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text.]

1987 material code	Material	1987		1982	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
<b>INDUSTRY 3547, ROLLING MILL MACHINERY</b>					
	<b>Materials, parts, containers, and supplies</b>	(X)	192.8	(X)	7187.3
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes	1,000 s tons	(S)	1.8	**4.9
331012	Sheet and strip	do	(S)	(*)	.2
331013	Plates	do	(S)	6.1	22.0
331015	Structural shapes	do	(S)	2.0	4.5
331017	Wire and wire products	do			2.3
331019	All other carbon steel mill shapes and forms	do	(S)	**3.9	—
	Alloy steel, except stainless:				
331021	Bars and bar shapes	1,000 s tons	(S)	4.2	—
331029	All other alloy steel mill shapes and forms	do	(S)	.6	(S)
331031	Stainless steel	do	(S)	.1	(Z)
335004	Copper and copper-base alloy	mil lb	**.1	.3	(Z)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil	mil lb			(Z)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc.	do	(S)	.6	—
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.)	do		—	—
335609	Nonferrous metal mill shapes and forms (except copper and aluminum)	do	(Z)	(Z)	—
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content)	do	(D)	(D)	(Z)
329101	Grinding wheels and other abrasive products, except industrial diamonds	do	(X)	.5	(X)
190023	Iron and steel scrap, excluding home scrap	1,000 s tons	(D)	(D)	.5
	Castings (rough and semifinished):				
332011	Iron (gray and malleable)	1,000 s tons	(S)	1.3	*2.7
332045	Steel	do	**1.4	2.6	4.9
336005	Aluminum and aluminum-base alloy	mil lb	(Z)	(Z)	(Z)
336006	Copper and copper-base alloy	do	(S)	.5	(S)
336008	Other nonferrous	do	(D)	(D)	(*)
346200	Iron and steel forgings	1,000 s tons	**26.1	22.3	14.8
349271	Fluid power (hydraulic and pneumatic) valves		(X)	.7	15.8
349261	Fluid power (hydraulic and pneumatic) hose or tube fittings and assemblies		(X)	(D)	1.1
	Electric motors and generators:				
362110	Fractional horsepower electric motors (less than 1 hp):				
362115	Timing motors, synchronous and subsynchronous	thousands			(D)
	Other fractional horsepower electric motors (less than 1 hp) (excluding timing motors)	do	(S)	4.2	—
362120	Integral horsepower motors and generators (1 hp and larger)	do			(S)
	Bearings, including mounted and unmounted:				
356218	Ball		(X)	(D)	(X)
356201	Roller		(X)	1.7	(X)
356601	Speed changers, gears, and industrial high-speed drives		(X)	6.3	(X)
	Pumps (complete assemblies):				
359412	Hydraulic fluid power pumps, motors, and hydrostatic transmissions	thousands	(D)	(D)	(S)
356102	Other pumps	do	(D)	(D)	(S)
356301	Air and gas compressors	do	(D)	(D)	(D)
356921	Filters for hydraulic fluid power systems		(X)	(Z)	(X)
359301	Fluid power (hydraulic and pneumatic) cylinders and rotary actuators		(X)	1.3	(X)
359302	Hydraulic and pneumatic equipment (except pumps, compressors, cylinders, and rotary actuators)		(X)	1.3	(X)
360101	Electric transmission, distribution, and control equipment		(X)	.4	(X)
265001	Paperboard containers, boxes, and corrugated paperboard	1,000 s tons	(X)	(D)	(Z)
305201	Rubber and plastics hose and belting		(X)	.1	(X)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products		(X)	.6	(X)
354501	Cutting tools for machine tools		(X)	1.2	(X)
362001	Electrical industrial capacitors, resistors, rheostats, and coil windings		(X)	(D)	(X)
362520	Numerical controls for metalworking machinery (except programmable)		(X)	—	(X)
362521	Programmable controllers for metalworking machinery		(X)	5.5	(D)
970099	All other materials and components, parts, containers, and supplies		(X)	72.5	(X)
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup>		(X)	41.4	351.6
					34.6
<b>INDUSTRY 3548, WELDING APPARATUS</b>					
	<b>Materials, parts, containers, and supplies</b>	(X)	10899.8	(NA)	(10)
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes	1,000 s tons	(S)	8.7	(NA)
331012	Sheet and strip	do	**4.0	48.0	(NA)
331013	Plates	do	(S)	6.2	(NA)
331015	Structural shapes	do	(S)	1.4	(NA)
331017	Wire and wire products	do	222.8	80.6	(NA)
331019	All other carbon steel mill shapes and forms	do	**10.0	4.3	(NA)
	Alloy steel, except stainless:				
331021	Bars and bar shapes	1,000 s tons	(S)	1.2	(NA)
331029	All other alloy mill shapes and forms	do	(D)	(*)	(NA)
331031	Stainless steel	do	(S)	10.2	(NA)
335001	Aluminum and aluminum-base alloy mill shapes and forms	mil lb	(S)	20.7	(NA)
335004	Copper and copper-base alloy	do	(S)	51.1	(NA)

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
<b>INDUSTRY 3548, WELDING APPARATUS—Con.</b>					
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content)-----mil lb--	(S)	9.4	(NA)	(NA)
332001	Castings (rough and semifinished): Iron (gray and malleable) and steel ----- 1,000 s tons--	(S)	2.5	(NA)	(NA)
336006	Copper and copper-base alloy ----- mil lb--	(S)	8.4	(NA)	(NA)
336005	Other nonferrous ----- do--	(S)	2.1	(NA)	(NA)
Electric motors and generators:					
362110	Fractional horsepower electric motors (less than 1 hp): Timing motors, synchronous and subsynchronous ----- millions--	(S)	1.3	(NA)	(NA)
362115	Other fractional horsepower electric motors (excluding timing motors) ----- thousands--	447.7	9.4	(NA)	(NA)
362120	Integral horsepower motors and generators (1 hp and larger) ----- do--	(S)	.2	(NA)	(NA)
Bearings, including mounted and unmounted:					
356218	Ball -----	(X)	3.4	(NA)	(NA)
356201	Roller -----	(X)	.9	(NA)	(NA)
356601	Speed changers, gears, and industrial high-speed drives -----	(X)	3.4	(NA)	(NA)
360101	Electric transmission, distribution, and control equipment -----	(X)	12.6	(NA)	(NA)
265001	Paperboard containers, boxes, and corrugated paperboard ----- 1,000 s tons--	(S)	12.3	(NA)	(NA)
305201	Rubber and plastics hose and belting -----	(X)	4.3	(NA)	(NA)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	(X)	7.9	(NA)	(NA)
362001	Electrical industrial capacitors, resistors, rheostats, and coil windings -----	(X)	23.7	(NA)	(NA)
970099	All other materials and components, parts, containers, and supplies -----	(X)	325.1	(NA)	(NA)
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup> -----	(X)	240.5	(NA)	(NA)
<b>INDUSTRY 3549, METALWORKING MACHINERY, N.E.C.</b>					
Materials, parts, containers, and supplies -----					
		(X)	10394.7	(NA)	(10)
Mill shapes and forms, except castings and forgings:					
Carbon steel:					
331011	Bars and bar shapes ----- 1,000 s tons--	(S)	7.0	(NA)	(NA)
331012	Sheet and strip ----- do--	(S)	2.1	(NA)	(NA)
331013	Plates ----- do--	(S)	3.9	(NA)	(NA)
331015	Structural shapes ----- do--	(S)	2.2	(NA)	(NA)
331017	Wire and wire products ----- do--	(S)	.3	(NA)	(NA)
331019	All other carbon steel mill shapes and forms ----- do--	(S)	3.6	(NA)	(NA)
Alloy steel, except stainless:					
331021	Bars and bar shapes ----- 1,000 s tons--	(S)	3.9	(NA)	(NA)
331029	All other alloy steel mill shapes and forms ----- do--	(S)	.5	(NA)	(NA)
331031	Stainless steel ----- do--	(S)	.2	(NA)	(NA)
335004	Copper and copper-base alloy ----- mil lb--	(S)	.1	(NA)	(NA)
Aluminum and aluminum-base alloy:					
335301	Sheet, plate, and foil ----- mil lb--	(S)	2.4	(NA)	(NA)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ----- do--	(S)	6.3	(NA)	(NA)
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ----- do--	(S)	.6	.9	(NA)
335609	Nonferrous metal mill shapes and forms (except copper and aluminum) ----- do--	(S)	.1	(NA)	(NA)
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content)-----do--	(S)	1.0	(NA)	(NA)
329101	Grinding wheels and other abrasive products, except industrial diamonds -----	(X)	.4	(NA)	(NA)
190023	Iron and steel scrap, excluding home scrap ----- 1,000 s tons--	(S)	-	(NA)	(NA)
Castings (rough and semifinished):					
332011	Iron (gray and malleable) ----- 1,000 s tons--	(S)	4.1	(NA)	(NA)
332045	Steel ----- do--	(S)	.9	(NA)	(NA)
336005	Aluminum and aluminum-base alloy ----- mil lb--	(S)	4.7	(NA)	(NA)
336006	Copper and copper-base alloy ----- do--	(S)	.3	(NA)	(NA)
336008	Other nonferrous ----- do--	(S)	.7	(NA)	(NA)
346200	Iron and steel forgings ----- 1,000 s tons--	(S)	2.9	(NA)	(NA)
349271	Fluid power (hydraulic and pneumatic) valves -----	(X)	1.1	(NA)	(NA)
349261	Fluid power (hydraulic and pneumatic) hose or tube fittings and assemblies -----	(X)	1.1	(NA)	(NA)
Electric motors and generators:					
362110	Fractional horsepower electric motors (less than 1 hp): Timing motors, synchronous and subsynchronous ----- thousands--	(S)	1.4	(NA)	(NA)
362115	Other fractional horsepower electric motors (less than 1 hp) (excluding timing motors) ----- do--	(S)	1.5	(NA)	(NA)
362120	Integral horsepower motors and generators (1 hp and larger) ----- do--	(S)	2.9	(NA)	(NA)
Bearings, including mounted and unmounted:					
356218	Ball -----	(X)	1.8	(NA)	(NA)
356201	Roller -----	(X)	1.2	(NA)	(NA)
356601	Speed changers, gears, and industrial high-speed drives -----	(X)	6.1	(NA)	(NA)
Pumps (complete assemblies):					
359412	Hydraulic fluid power pumps, motors, and hydrostatic transmissions ----- thousands--	(S)	2.5	(NA)	(NA)
356102	Other pumps ----- do--	(S)	.4	(NA)	(NA)
356301	Air and gas compressors ----- do--	(S)	.3	(NA)	(NA)
356921	Filters for hydraulic fluid power systems -----	(X)	.4	(NA)	(NA)
359301	Fluid power (hydraulic and pneumatic) cylinders and rotary actuators -----	(X)	2.3	(NA)	(NA)
359302	Hydraulic and pneumatic equipment (except pumps, compressors, cylinders, and rotary actuators) -----	(X)	1.6	(NA)	(NA)

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1987 and 1982—Con.

[includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
<b>INDUSTRY 3549, METALWORKING MACHINERY, N.E.C.—Con.</b>					
360101	Electric transmissions, distribution, and control equipment	(X)	11.9	(NA)	(NA)
265001	Paperboard containers, boxes, and corrugated paperboard 1,000 s tons	(S)	.2	(NA)	(NA)
305201	Rubber and plastics hose and belting	(X)	.4	(NA)	(NA)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products	(X)	1.4	(NA)	(NA)
354501	Cutting tools for machine tools	(X)	1.6	(NA)	(NA)
362001	Electrical industrial capacitors, resistors, rheostats, and coil windings	(X)	1.2	(NA)	(NA)
362520	Numerical controls for metalworking machinery (except programmable)	(X)	1.6	(NA)	(NA)
362521	Programmable controllers for metalworking machinery	(X)	5.4	(NA)	(NA)
970099	All other materials and components, parts, containers, and supplies	(X)	116.2	(NA)	(NA)
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup>	(X)	182.8	(NA)	(NA)

<sup>1</sup>For some establishments, data have been estimated from central unit values which are based on quantity-cost relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: \* 10 to 19 percent estimated; \*\* 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

<sup>2</sup>Total cost of materials of establishments that did not report detailed materials data, including establishments that were not mailed a form.

<sup>3</sup>Data are included with material code 970099 to avoid disclosing data for individual companies.

<sup>4</sup>For 1982, data for material code 335003 included only copper and copper-base alloy bare wire for electrical conduction and pipe and tube.

<sup>5</sup>For 1982, data for material codes 280020 and 320601 were not collected separately but were included with material code 970099.

<sup>6</sup>For 1982, data for copper and copper-base alloy castings (rough and semifinished) were included with material code 970099 to avoid disclosing data for individual companies.

<sup>7</sup>For 1982, total included data for copper and copper-base alloy rod, bar, and mechanical wire, including extruded and/or drawn shapes and pipe and tube and fabricated rubber products (except tires, tubes, hose, belting, and gaskets).

<sup>8</sup>For 1987, data for material code 331012 were combined with material code 331019 to avoid disclosing data for individual companies.

<sup>9</sup>For 1982, data included only copper and copper-base alloy plate, sheet, and strip, including military cups and discs.

<sup>10</sup>Industry definition is new for 1987; therefore, 1987 data for materials consumed are not comparable to prior-year data. As a result, 1982 materials consumed data are not available.



## APPENDIX A. Explanation of Terms

This appendix is in two sections. Section 1 includes items requested of all establishments mailed census of manufactures forms including annual survey of manufactures (ASM) forms. Note that this section also includes several items (number of establishments and companies, value added, classes of products, and specialization and coverage ratios) not included on the report forms but derived from information collected on the forms. Section 2 covers supplementary items requested only from establishments included in the ASM sample. Results of the supplementary ASM inquiries are included in table 3c of this report.

### SECTION 1. ITEMS COLLECTED OR DERIVED BASED ON ALL CENSUS OF MANUFACTURES (INCLUDING ASM) REPORT FORMS

**Number of establishments and companies**—As discussed in the Introduction, a separate report was required for each manufacturing establishment (plant) with one employee or more. An establishment is defined as a single physical location where manufacturing is performed. A company, on the other hand, is defined as a business organization consisting of one establishment or more under common ownership or control.

If the company operated at different physical locations, even if the individual locations were producing the same line of goods, a separate report was requested for each location. If the company operated in two or more distinct lines of manufacturing at the same location, a separate report was requested for each activity.

An establishment not in operation for any portion of the year was requested to return the report form with the proper notation in the "Operational Status" section of the form. In addition, the establishment was requested to report data on any employees, capital expenditures, inventories, or shipments from inventories during the year.

In this report, data are shown for establishments in operation at any time during the year. A comparison with the number of establishments in operation at the end of the year will be provided in the Introduction of the General Summary subject report.

**Employment and related items**—The report forms requested separate information on production workers for a specific payroll period within each quarter of the year and on other employees as of the payroll period which included the 12th of March.

**All employees**—This item includes all full-time and part-time employees on the payrolls of operating manufacturing establishments during any part of the pay period which included the 12th of the months specified on the report form. Included are all persons on paid sick leave, paid holidays, and paid vacations during these pay periods.

Officers of corporations are included as employees; proprietors and partners of unincorporated firms are excluded. The "all employees" number is the average number of production workers plus the number of other employees in mid-March. The number of production workers is the average for the payroll periods including the 12th of March, May, August, and November.

**Production workers**—This item includes workers (up through the line-supervisor level) engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial and guard services, product development, auxiliary production for plant's own use (e.g., power plant), recordkeeping, and other services closely associated with these production operations at the establishment covered by the report. Employees above the working-supervisor level are excluded from this item.

**All other employees**—This item covers nonproduction employees of the manufacturing establishment including those engaged in factory supervision above the line-supervisor level. It includes sales (including driver salespersons), sales delivery (highway truck drivers and their helpers), advertising, credit, collection, installation and servicing of own products, clerical and routine office function, executive, purchasing, financing, legal, personnel (including cafeteria, medical, etc.), professional, and technical employees. Also included are employees on the payroll of the manufacturing establishment engaged in the construction of major additions or alterations to the plant and utilized as a separate work force.

In addition to reports sent to operating manufacturing establishments, information on employment during the payroll period which included March 12 and annual payrolls also was requested of auxiliary units (e.g., administrative offices, warehouses, and research and development laboratories) of multiestablishment companies. However, these figures are not included in the totals for individual

industries shown in this report. They are included in the general summary and geographic area reports as a separate category.

**Payroll**—This item includes the gross earnings of all employees on the payroll of operating manufacturing establishments paid in the calendar year 1987. Respondents were told they could follow the definition of payrolls used for calculating the Federal withholding tax. It includes all forms of compensation, such as salaries, wages, commissions, dismissal pay, bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. The total includes salaries of officers of corporations; it excludes payments to proprietors or partners of unincorporated concerns. Also excluded are payments to members of Armed Forces and pensioners carried on the active payroll of manufacturing establishments.

The census definition of payrolls is identical to that recommended to all Federal statistical agencies by the Office of Management and Budget. It should be noted that this definition does not include employers' Social Security contributions or other nonpayroll labor costs, such as employees' pension plans, group insurance premiums, and workers' compensation.

The ASM provides estimates of employers' supplemental labor costs, both those required by Federal and State laws and those incurred voluntarily or as part of collective bargaining agreements. (Supplemental labor costs are explained later in this appendix.)

As in the case of employment figures, the payrolls of separate auxiliary units of multiestablishment companies are not included in the totals for individual industries or industry groups.

**Production-worker hours**—This item covers hours worked or paid for at the plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave.

**Cost of materials**—This term refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuel consumed, whether purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.

The important components of this cost item are (1) all raw materials, semifinished goods, parts, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year, (2) electric energy purchased, (3) fuels consumed for heat, power, or the generation of electricity, (4) work done by

others on materials or parts furnished by manufacturing establishments (contract work), and (5) products bought and resold in the same condition. (See discussion of duplication of data below.)

**Specific materials consumed**—In addition to the total cost of materials, which every establishment was required to report, information also was collected for most manufacturing industries on the consumption of major materials used in manufacturing. The inquiries were restricted to those materials which were important parts of the cost of production in a particular industry and for which cost information was available from manufacturers' records. Information on the establishments consuming less than a specified amount (usually \$10,000) of a specific material were not requested to report consumption of that material separately. Also, the cost of materials for the small establishments for which either administrative records or short forms were used was imputed as "not specified by kind." (See the introduction for the importance of administrative records in the industry.)

**Value of shipments**—This item covers the received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all miscellaneous receipts, such as receipts for contract work performed for others, installation and repair, sales of scrap, and sales of products bought and resold without further processing. Included are all items made by or for the establishments from materials owned by it, whether sold, transferred to other plants of the same company, or shipped on consignment. The net selling value of products made in one plant on a contract basis from materials owned by another was reported by the plant providing the materials.

In the case of multiunit companies, the manufacturer was requested to report the value of products transferred to other establishments of the same company at full economic or commercial value, including not only the direct cost of production but also a reasonable proportion of "all other costs" (including company overhead) and profit. (See discussion of duplication of data below.)

**Individual products**—As in previous censuses, data were collected for most industries on the quantity and value of individual products shipped. In the 1987 census program, information was collected on the output of approximately 11,000 individual product items. The term "product", as used in the census of manufactures, represents the finest level of detail for which output information was requested. Consequently, it is not necessarily synonymous with the term "product" as used in the marketing sense. In some cases, it may be much more detailed and, in other cases, it is more aggregative. For example, "pharmaceutical preparations" was distributed into over 100 terms; whereas, "motor gasoline" was reported as a single item.

Approximately 6,600 of the product items were listed separately on the 1987 census report forms. Data for

about 4,400 products were obtained in the monthly, quarterly, or annual surveys comprising the Current Industrial Reports series of the Census Bureau. Totals for the year 1987 for these items, as derived from the commodity surveys, are shown in the "products shipped" table (table 6a-2).

The list of products for which separate information was collected was prepared after consultation with industry and government representatives. Comparability with previous figures was given considerable weight in the selection of product categories so that comparable 1982 information is presented for most products.

Typically, both quantity and value of shipments information were collected. However, if quantity was not significant or could not be reported by manufacturers, only value of shipments was collected.

Shipments include both commercial shipments and transfers of products to other plants of the same company. For industries in which a considerable portion of the total shipments is transferred to other plants of the same company, separate information on interplant transfers also was collected. Moreover, for products that are used to a large degree within the same establishment as materials or components in the fabrication of other products, total production and often consumption of the item within the plant was collected. Typically, the information on production also was collected for products for which there are significant differences between total production and shipments in a given year because of wide fluctuations in finished goods inventories. Other measures of output of products with long production cycles were used as appropriate and feasible.

**Classes of products**—To summarize the product information, the separate products were aggregated into classes of products that, in turn, were grouped into all primary products of each industry. The code structure used is a seven-digit number for the individual product, a five-digit number for the class of product, and a four-digit number for the total primary products in an industry. (See Introduction, Industry Classification of Establishments, for application of the coding structure to the assignment of SIC codes for establishments.)

In the 1987 census, the 11,000 products were grouped into approximately 1,500 separate classes on the basis of general similarity of manufacturing processes, types of materials used, and the like. However, the grouping of products was affected by the economic significance of the class and, in some cases, dissimilar products were grouped because the products were not sufficiently significant to warrant separate classes.

**Duplication in cost of materials and value of shipments**—The aggregate of the cost of materials and value of shipments figures for industry groups and for all manufacturing industries includes large amounts of duplication since the products of some industries are used as materials by others. This duplication results, in part, from the

addition of related industries representing successive stages in the production of a finished manufactured product. Examples are the addition of flour mills to bakeries in the food group and the addition of pulp mills to paper mills in the paper and allied products group of industries. Estimates of the overall extent of this duplication indicate that the value of manufactured products exclusive of such duplication (the value of finished manufactures) tends to approximate two-thirds of the total value of products reported in the annual survey.

Duplication of products within individual industries is significant within a number of industry groups, e.g., machinery and transportation industries. These industries frequently include complete machinery and their parts. In this case, the parts made for original equipment are materials consumed for assembly plants in the same industry.

Even when no significant amount of duplication is involved, value of shipments figures are deficient as measures of the relative economic importance of individual manufacturing industries or geographic areas because of the wide variation in ratio of materials, labor, and other processing costs of value of shipments, both among industries and within the same industry.

Before 1962, cost of materials and value of shipments were not published for some industries which included considerable duplication. Since then, these data have been published for all industries at the United States level and beginning in 1964, for all geographic levels.

**Value added by manufacture**—This measure of manufacturing activity is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments (products manufactured plus receipts for services rendered). The result of this calculation is adjusted by the addition of value added by merchandising operations (i.e., the difference between the sales value and the cost of merchandise sold without further manufacture, processing, or assembly) plus the net change in finished goods and work-in-process between the beginning- and end-of-year inventories.

For those industries where value of production is collected instead of value of shipments (see footnote in table 1a), value added is adjusted only for the change in work-in-process inventories between the beginning and end of year. For those industries where value of work done is collected, the value added does not include an adjustment for the change in finished goods or work-in-process inventories.

"Value added" avoids the duplication in the figure for value of shipments that results from the use of products of some establishments as materials by others. Value added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

**New and used capital expenditures**—For establishments in operation and any known plants under construction, manufacturers were asked to report their new expenditures for (1) permanent additions and major alterations to

manufacturing establishments, and (2) machinery and equipment used for replacement and additions to plant capacity if they were of the type for which depreciation accounts were ordinarily maintained.

The totals for new expenditures include expenditures leased from nonmanufacturing concerns through capital leases, new facilities owned by the Federal Government but operated under contract by private companies, and plant and equipment furnished to the manufacturer by communities and nonprofit organizations. Also excluded are expenditures for used plant and equipment (although reported in the census), expenditures for land, and cost of maintenance and repairs charged as current operating expenses.

Manufacturers also were requested to report the value of all used buildings and equipment purchased during the year at the purchase price. For any equipment or structure transferred for the use of the reporting establishment by the parent company or one of its subsidiaries, the value at which it was transferred to the establishment was to be reported. Furthermore, if the establishment changed ownership during the year, the cost of the fixed assets (building and equipment) was to be reported under used capital expenditures.

Total expenditures for used plant and equipment is a universe figure; it is collected on all census forms. However, the breakdown of this figure between expenditures for used buildings and other structures and expenditures for used machinery and equipment is collected only on the ASM form. The data for total new capital expenditures, new building expenditures, and new machinery expenditures, as well as the data for total used expenditures, are shown in table 3b.

**End-of-year inventories**—Respondents were asked to report their 1986 and 1987 end-of-year inventories at cost or market. Effective with the 1982 Economic Censuses, this change to a uniform instruction for reporting inventories was introduced for all sector reports. Prior to 1982, respondents were permitted to value inventories using any generally accepted accounting method (FIFO, LIFO, market, to name a few). In 1982, LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve.

## SECTION 2. ITEMS COLLECTED ONLY ON ASM REPORT FORMS

The following items were collected only from establishments included in the ASM sample:

- 1. Supplemental labor costs**—Supplemental labor costs are divided into legally required expenditures and payments for voluntary programs. The legally required portion consists primarily of Federal old age and survivors' insurance, unemployment compensation, and workers' compensation. Payments for voluntary programs include all programs not

Because of this change in reporting instructions, the 1982 through 1987 data for inventories and value added by manufacture included in the tables of this report are not comparable to the prior-year data shown in table 1a of this report and in historical census of manufactures and annual survey of manufactures publications.

In using inventory data by stage of fabrication for "all industries" and at the two-digit industry level, it should be noted that an item treated as a finished product by an establishment in one industry may be reported as a raw material by another establishment in a different industry. For example, the finished-product inventories of a steel mill would be reported as raw materials by a stamping plant. Such differences are present in the inventory figures by stage of fabrication shown for individual industries, industry groups, and "all manufacturing", which are aggregates of figures reported by establishments in specified industries.

**Specialization and coverage ratios**—These items are not collected on the report forms but are derived from the data shown in table 5b. An establishment is classified in a particular industry if its shipments of primary products of that industry exceed in value its shipments of the products of any other single industry.

As noted in the introduction, an establishment's shipments include those products assigned to an industry (primary products), those considered primary to other industries (secondary products), and receipts for miscellaneous activities (merchandising, contract work, resales, etc.). Specialization and coverage ratios have been developed to measure the relationship of primary product shipments to the data on shipments for the industry shown in tables 1a through 5a and data on product shipments shown in tables 6a through 6c.

Specialization ratio represents the ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for the establishments classified in the industry.

Coverage ratio represents the ratio of primary products shipped by the establishments classified in the industry to the total shipments of such products that are shipped by all manufacturing establishments wherever classified.

specifically required by legislation whether they were employer initiated or the result of collective bargaining. They include the employer portion of such plans as insurance premiums, premiums for supplemental accident and sickness insurance, pension plans, supplemental unemployment compensation, welfare plans, stock purchase plans on which the employer payment is not subject to withholding tax, and deferred profit-sharing plans.

They exclude such items as company-operated cafeterias, in-plant medical services, free parking lots, discounts on employee purchases, and uniforms and work clothing for employees. While the excluded items do benefit employees and all or part of their cost generally is similar to the items covered in the ASM labor costs statistics, accounting records generally do not provide reliable figures on net employee benefits of these types.

2. **Retirements of depreciable assets**—Included in this item is the gross value of assets sold, retired, scrapped, destroyed, etc., during 1987. When a complete operation or establishment changed ownership, the respondent was instructed to report the value of the assets sold at the original cost as recorded in the books of the seller. The respondent also was requested to report retirements of equipment or structures owned by a parent company that the establishment was using as if it were a tenant.
3. **Depreciation charges for fixed assets**—This item includes depreciation and amortization charged during the year against assets. Depreciation charged against fixed assets acquired since the beginning of the year and against assets sold or retired during the year are components of this category. Respondents were requested to make certain that they did not report accumulated depreciation.
4. **Rental payments**—Total rental payments is collected on all census forms. However, the breakdown between rental payments for buildings and other structures and rental payments for machinery and equipment is collected only on the ASM forms. This item includes rental payments for the use of all items for which depreciation reserves would be maintained if they were owned by the establishment, e.g., structures and buildings, and production, office, and transportation equipment. Excluded are royalties and other payments for the use of intangibles and depletable assets, and land rents where separable.
5. **Depreciable assets**—Total value of gross depreciable assets is collected on all census forms.

However, the detail for depreciable assets is collected only on the ASM forms. The data encompass all fixed depreciable assets on the books of establishments at the beginning and end of the year. The values shown (book value) represent the actual cost of assets at the time they were acquired, including all costs incurred in making the assets usable (such as transportation and installation). Included are all buildings, structures, machinery, and equipment (production, office, and transportation equipment) for which depreciation reserves are maintained. Excluded are nondepreciable capital assets, including inventories and intangible assets, such as timber and mineral rights.

The definition of fixed depreciable assets is consistent with the definition of capital expenditures. For example, expenditures include actual capital outlays during the year, rather than the final value of equipment put in place and buildings completed during the year. Accordingly, the value of assets at the end of the year includes the value of construction in progress. In addition, respondents were requested to make certain that assets at the beginning of the year plus new and used capital expenditures, less retirements, equalled assets at the end of the year.

6. **New and used capital expenditures**—The data for total new capital expenditures, new building expenditures, new machinery expenditures, and total used capital expenditures are collected on all census forms. However, the breakdown between expenditures for used buildings and other structures and expenditures for used machinery and equipment is collected only on the ASM form. (See further explanation on capital expenditures in section 1.)
7. **Quantity of electric energy consumed for heat and power**—Data on the cost of purchased electric energy were collected on all census forms. However, data on the quantity of purchased electric energy were collected only on the ASM forms. In addition, information was collected on the quantity of electric energy generated by the establishment and the quantity of electric energy sold or transferred to other plants of the same company.
8. **Breakdown of new capital expenditures for machinery and equipment**—ASM establishments were requested to separate their capital expenditures for new machinery and equipment into (1) automobiles, trucks, etc., for highway use, (2) computers and peripheral data processing equipment, and (3) all other.

The category "automobiles, trucks, etc., for highway use" is intended to measure expenditures for vehicles designed for highway use that were acquired through a purchase or lease-purchase agreement.

Vehicles normally operating off public highways (vehicles specifically designed to transport materials, property, or equipment on mining, construction, logging, and petroleum development projects) are excluded from this item.

9. **Foreign content of cost of materials**—Establishments included in the ASM sample panel were requested to provide information on foreign-made materials purchased or transferred from foreign sources. This includes materials acquired from a central warehouse or other domestic establishment of the same company but made in an operation outside of the 50 States, District of Columbia, Puerto Rico, or U.S. territories.
10. **Cost of purchased services**—ASM establishments were requested to provide information on the cost of purchased services for the repair of buildings and other structures, the repair of machinery, and communication services. Included in the cost of purchased services for the repair of buildings and machinery are payments made for all maintenance and repair work on buildings and equipment, such as painting, roof repairs, replacing parts, and overhauling equipment. Such payments made to other establishments of the same company and for repair and maintenance of any leased property also are included. Extensive repairs or reconstruction that were capitalized are considered capital expenditures for used buildings and machinery and are, therefore, excluded from this item. Repair and maintenance costs provided by an owner as part of a rental contract or incurred directly by an establishment in using its own work force also are excluded.

Three basic approaches were utilized to produce these statistics.

1. For items 1 through 6, data were estimated (imputed) for all non-ASM establishments using the available data in the establishment record and industry-based parameters. The statistics were then generated by simply tabulating all census records including the imputed value for non-ASM establishments and the unweighted value for ASM establishments. Separate imputation rates were developed and are shown in the table. For quantity of purchased electricity for heat and power (item 7), a similar procedure was used; however, the imputation parameters were geographically-based instead of industry-based. For quantities of generated less sold electricity, no imputation was performed for non-ASM establishments. The estimates for these items are simply tabulations of unweighted ASM values.

Since the published statistics for these items were developed from the complete census universe and not just the ASM establishments, there are no sampling variances associated with these statistics. However, there is an unknown level of bias for each of the items due to the imputation of the non-ASM establishments. This bias is felt to be small due to the strong correlation between the items being imputed and the collected items that were used to generate the impute values.

2. For items 8 and 9, the estimates were developed using a ratio estimation methodology. For item 8, an estimate of the breakout of new capital expenditures for machinery and equipment into the three categories was made from ASM establishments reporting these categories. The estimated proportions were then applied to the corresponding Census value for new capital expenditures for machinery and equipment to produce the estimates.

The estimates for item 9, foreign content of cost of materials, were developed in a similar manner based on costs of parts, supplies, and components (item 5a) as the control total for the three categories.

For items 8 and 9, an adjustment ratio of the following form was computed.

$$R_j = \frac{NMC}{TMEasm}$$

where:

NMC = the census value of new capital expenditures for machinery and equipment

TMEasm = the weighted ASM value of new capital expenditures for machinery and equipment from reporters of the detailed breakout data

3. For item 10, cost of purchased services, the estimates were made by simply tabulating weighted data for all the ASM records that reported the item. A response coverage ratio (a measure of the extent to which respondents reported for each item) is shown in table 3c for the three types of services. It is derived for each item by calculating the ratio of the weighted employment (establishment data multiplied by sample weight, see appendix B) for those ASM establishments that reported the specific inquiry to the weighted total employment for all ASM establishments classified in the industry.

# APPENDIX B.

## Annual Survey of Manufactures (ASM) Sampling and Estimating Methodologies

### DESCRIPTION OF SURVEY SAMPLE

The Annual Survey of Manufactures (ASM) contains two components. The mail portion of the survey is a probability sample of about 56,000 manufacturing establishments selected from a total of about 220,000 establishments. These 220,000 establishments represent all manufacturing establishments of multiunit companies and all single establishment companies mailed schedules in the 1982 Census of Manufactures. This mail portion is supplemented annually by a Social Security Administration list of new manufacturing establishments opened after 1982 and a list of new multiunit manufacturing establishments identified from the Census Bureau's Company Organization Survey.

The 1984 through 1988 ASM sample differs slightly from the previous sample. For the current panel, all establishments of companies with 1982 shipments in manufacturing in excess of \$500 million were included in the survey panel with certainty. There are approximately 500 such companies collectively accounting for approximately 18,000 establishments. For the remaining portion of the mail survey, the establishment was defined as the sampling unit. For this portion, all establishments with 250 employees or more and establishments with a very large value of shipments also were included in the survey panel with certainty. A total of 12,100 establishments were selected from this portion of the universe with certainty. Therefore, of the 56,000 manufacturing establishments included in the ASM panel, approximately 31,000 are selected with certainty. These certainty establishments collectively account for approximately 80 percent of the total value of shipments in the 1982 census.

Smaller establishments in the remaining portion of the mail survey were sampled with probabilities ranging from 0.999 to 0.005 in accordance with mathematical theory for optimum allocation of a sample. The probabilities of selection assigned to the smaller establishments were proportional to measures of size determined for each establishment. The measures of size depend directly upon each establishment's 1982 product class values and the historic variability of the year-to-year shipments of each product class. Product classes displaying more volatile year-to-year change in shipments at the establishment level were sampled at a heavier rate.

This method of assigning measures of size was used in order to maximize the precision (that is, minimize the variance of estimates of the year-to-year change) in the value of product class shipments. Implicitly, it also gave weight differences in employment, value added, and other

general statistics, since these are highly correlated with value of shipments. Individual sample selection probabilities were obtained by multiplying each establishment's final measure of size by an overall sampling fraction coefficient calculated to yield a total expected sample size.

The sample selection procedure gave each establishment in the sampling frame an independent chance of selection. This method of independent selection permits the rotation of small establishments out of a given sample panel without introducing a bias into the survey estimates.

The nonmail portion of the survey includes all single-establishment companies that were tabulated as administrative records in the 1982 Census of Manufactures. Although this portion contained approximately 130,000 establishments, it accounted for less than 2 percent of the estimate for total value of shipments at the total manufacturing level. This portion was not sampled; rather, the data for every establishment in this group were estimated based on selected information obtained annually from the administrative records of the Internal Revenue Service and the Social Security Administration. This administrative-record information, which includes payroll, total employment, industry classification, and physical location of the establishment, was obtained under conditions which safeguard the confidentiality of both tax and census records. Estimates of data other than payroll and employment for these small establishments were developed from industry averages.

The corresponding estimates for the mail and nonmail establishments were added together, along with the base-year differences, as defined in the Description of Estimating Procedure section, to produce the figures shown in this publication.

### DESCRIPTION OF ESTIMATING PROCEDURES

Most of the ASM estimates for the years 1983-1986 were computed using a difference estimation procedure. For each item, a base-year difference was developed. This base-year difference is equal to the difference between the 1982 census published number for an item total and the linear ASM estimate of the total for 1982. The ASM linear estimate was obtained by multiplying each sample establishment's data by its sample weight (the reciprocal of its probability of selection) and summing the weighted values.

These base-year differences were then added to the corresponding current-year linear estimates, which include the sum of the estimates for the mail and nonmail establishments, to produce the estimates for the years 1983-1986. Estimates developed by this procedure usually are far more reliable than comparable linear estimates developed from the current sample data alone.

The 1987 sample estimates for the purchased service items, shown in table 3c, are strictly ASM linear estimates, however, developed only from ASM establishments that reported the specific item.

The remaining estimates in table 3c, showing the breakdown of expenditures for new machinery and equipment and costs of parts (separated into purchases from foreign sources and purchases from domestic sources), were computed as ratio estimates. To do this, linear estimates of the new machinery detail items were developed from the ASM establishments and were ratio adjusted to the corresponding census total for new machinery. In a similar fashion, the ASM linear estimates of the detailed purchased materials items were ratio adjusted to the corresponding census total for cost of parts.

## QUALIFICATIONS OF THE DATA

The estimates developed from the sample are apt to differ somewhat from the results of a survey covering all companies in the sampled lists but otherwise conducted under essentially the same conditions as the actual sample survey. The estimates of the magnitude of the sampling errors (the differences between the estimates obtained and the results theoretically obtained from a comparable, complete-coverage survey) are provided by the standard errors of the estimates.

The particular sample selected for the ASM is one of a large number of similar probability samples that, by chance, might have been selected under the same specifications. Each of the possible samples would yield somewhat different sets of results, and the standard errors are measures of the variation of all the possible sample estimates around the theoretical, comparable, complete-coverage values.

Estimates of the standard errors have been computed from the sample data for selected statistics in this report. They are presented in the form of relative standard errors (the standard errors divided by the estimated values to which they refer).

In conjunction with its associated estimate, the relative standard error may be used to define confidence intervals (ranges that would include the comparable, complete-coverage value for specified percentages of all the possible samples).

The complete coverage value would be included in the range:

1. From one standard error below to one standard error above the derived estimate for about two-thirds of all possible samples.
2. From two standard errors below to two standard errors above the derived estimate for about 19 of 20 of all possible samples.
3. From three standard errors below to three standard errors above the derived estimate for nearly all samples.

An inference that the comparable, complete-survey result would be within the indicated ranges would be correct in approximately the relative frequencies shown. Those proportions, therefore, may be interpreted as defining the confidence that the estimates from a particular sample would differ from complete-coverage results by as much as one, two, or three standard errors, respectively.

For example, suppose an estimated total is shown as 50,000 with an associated relative standard error of 2 percent, that is, a standard error of 1,000 (2 percent of 50,000). There is approximately 67 percent confidence that the interval 49,000 to 51,000 includes the complete-coverage total, about 95 percent confidence that the interval 48,000 to 52,000 includes the complete-coverage total and almost certain confidence that the interval 47,000 to 53,000 includes the complete coverage total.

In addition to the sample errors, the estimates are subject to various response and operational errors: errors of collection, reporting, coding, transcription, imputation for nonresponse, etc. These operational errors also would occur if a complete canvass were to be conducted under the same conditions as the survey. Explicit measures of their effects generally are not available. However, it is believed that most of the important operational errors were detected and corrected in the course of the Bureau's review of the data for reasonableness and consistency. The small operational errors usually remain. To some extent, they are compensating in the aggregated totals shown. When important operational errors were detected too late to correct the estimates, the data were suppressed or were specifically qualified in the tables.

As derived, the estimated standard errors included part of the effect of the operational errors. The total errors, which depend upon the joint effect of the sampling and operational errors, are usually of the order of size indicated by the standard error, or only moderately higher. However, for particular estimates, the total error may considerably exceed the standard errors shown.

The concept of complete coverage under the conditions prevailing for the ASM is not identical to the complete coverage of the census of manufactures, as the censuses have been conducted. Nearly all types of operational errors that affect the ASM also occur in the censuses. The ASM and the censuses, are conducted under quite different conditions, and operational errors can be better controlled in the ASM than in the censuses. As a result, for many of the census figures, the errors are of the same order of size as the total errors of the corresponding annual survey estimates. The differences between the census and ASM operating conditions also disturb, to some degree, the comparability of the ASM and census data.

Any figures shown in the tables in this publication having an associated standard error exceeding 15 percent may be of limited reliability. However, the figure may be combined with higher-level totals, creating a broader aggregate, which then may be of acceptable reliability.

# APPENDIX C.

## Changes in Census of Manufactures

### Product Classes for 1987

[Based on revisions to the Standard Industrial Classification (SIC) Manual, definitions of some product classes were revised for 1987. Listed below are the revisions to the product classes]

1987	1982	1987	1982	1987	1982	1987	1982
30521	30411	30899	3079K pt	34919	34948	35483	36233
		3089A		34921	3494B	35484	35496
30522	30412	32295	32291 pt	34922	3494C	35485	35495 pt 35497
30523	30413	32296	32292 pt	34923	3494D	35533	35531 pt
30524	30414	32297	32294 pt	34924	3494E	35534	35532 pt
30525	30415			34925	3494F	35543	35541 35542 pt
30526	30416	32298	32291 pt 32292 pt 32294 pt	34926	3494G	35544	35542 pt
30534	32934	32311	32317	34927	3494H	35558	35557 pt
30535	32935	32312	32317			35561	35511
30536	32936	32927	32928 32929			35562	35512
30537	32937					35563	35513 pt
30538	32938	32961	32963 32965	3523E	35234 pt 35238 pt	35591	35591 35699 pt
30539	32939	32962	32964 32966	3523F	3523A 3523B	35596	35595 pt
30611	3069A pt	33152	33152 34967	35246	35243 35245	35597	35494
30612	3069A pt					35599	35595 pt 36360 36362
30613	3069A pt	33391	33331	3531A	35311		
30614	3069B pt	33392	33334	3531B	35312		
30615	3069B pt	33398	33321 33323 33399	3531C	35317		
30616	3069B pt			3531E	35314 pt	35616	3561C
30617	3069B pt	33561	33569	3531F	35316	35631	35631 pt
3069C	3069C 35557 pt	33562 33563		3531G	35318 pt	35651	35513 pt 35514 pt 35691 pt
3069E	30310	33630	33611	3531H	35313 pt 35318 pt 35319 pt	35652	35513 pt 35514 pt 35691 pt
30810	30792	33640	33620 pt 33691 pt 33692 pt 33693 pt	3531K	35319 pt 35361 pt 35371 pt	35676	35672
30820	3079K pt	33650	33612			35692	35694 35695 35696
30830	3079K pt	33660	33620 pt	3531M	35313 pt 35314 pt 35319 pt 35372 pt		
30840	30794					35697 35698	35699 pt
30850	30795	33690	33691 pt 33692 pt 33693 pt	35337	35331 35332 pt		
30861	30797	34234	34232 pt			35711	35731 36629 pt
30862		34235	34232 pt 35531 pt 35532 pt	35338	35332 pt	35712	35734 pt 35735 pt
30863				35339	35333		
30864				3533A	35335	35721	35732 pt
30865		34236	34233	3533B	35336	35722	35734 pt 35735 pt
30866				35363	35361 pt		
30870	3079K pt			35364	35362 pt	35751	35732 pt 36612 pt
30880	3079J pt 3079K pt			35373	35362 pt 35371 pt	35752	35734 pt 35735 pt
30891	3079J pt 3079K pt	34441 34443 34447 34448 34449	34446	35374	35362 pt 35372 pt	35771	35732 pt
30892	3079J pt 3079K pt	34461 34462 34463	34460	3541D	35411 35412	35772	35734 pt 35735 pt
30893	3079J pt 3079K pt	34464 34465				35781	35743
30894	3079J pt 3079K pt	34696 34699	34699			35782	35744
30895	3079J pt	34911 34912	3494A	35430	35650	35783	35745
30896	2499A pt 3079J pt 3079K pt	34913 34914 34915 34916		35445	35453	3585C	3585A 36993
30897	3079J pt 3079K pt	34917	34949	35455	35452		
30898	3079J pt 3079K pt	34918	34947	35482	36232	3585D	3585B 36994 pt

{Based on revisions to the Standard Industrial Classification (SIC) Manual, definitions of some product classes were revised for 1987. Listed below are the revisions to the product classes}

1987	1982	1987	1982	1987	1982	1987	1982
35931	35996 35997	36411	36410	36991—Con. 36995	36629 pt—Con.	38731—Con.	38734—Con. 38736 38737
35932	35998	36412	36994 pt	36997	35497 pt 36629 pt		39113 39114
35933	35999	36520	36521 pt	36998	36994 pt	39113 39114	39112
35941	35617 35618 35631 pt	36613	35732 pt 36612 pt	3714A	37143	39153 39154	39151
35942	3561A 3561B 35631 pt	36614	36612 pt	37999	37994 37998	39447	36629 pt 39447
35961	35760	36632	36622	38121	38111	39493	39494 pt
35962		36691	36624	38122	36625 pt 36629	39495	3079k pt
35963		36692	36626	38210	38112 38113 pt	39496	39494 pt
36123	36125	36693	36628	38260	38320 38326	39523	39521 39522 pt
36126		36714	36711 36712	38271	38324	39524	39522 pt
36251	36138 pt 36794	36715	36799 pt	38272	38325	39651	39630
36252	36221	36720	36797	38273		39654	39641
36253	36222	36799	36629 pt 36799 pt	38295	36625 pt 38293	39656	39642
36254	36138 pt 36223	36950	35732 pt 36792	38296	38113 pt	39998	39620
36330	36331 36333	36991	36629 pt	38440	36931	39999	39995
36395	36361 36394 36399	36992		38450	36930 36933	97372	36522
				38731	38734	97819	36521 pt

# APPENDIX D.

## Changes in Census of Manufactures

### Product Codes for 1987

[Based on revisions to the Standard Industrial Classification (SIC) Manual, definitions of some product codes were revised for 1987. Listed below are the revisions to the product codes. The terms published and collected are defined as follows: (1) published refers to the code used in the published reports for 1987 and 1982, and (2) collected refers to the code appearing on the report forms for 1987]

1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published
30118 00	30118 00	30118 19 30118 20	30539 77	32939 77	32939 77	30830 11	30793 01	3079K 90	30892 20— Con.	3079D 33— Con.	3079J 61 pt —Con. 3079J 66 pt 3079K 93 pt
3011A 39	3011A 39	3011A 33 3011A 35	30539 79	32939 79	32939 79	30830 13	30793 03	3079K 90		3079D 35	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 93 pt
3011C 29	3011C 29	3011C 24 3011C 26 3011C 27	30539 81	32939 81	32939 81	30840 11	30794 21	30794 21		3079D 39	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 93 pt
30521 00	30411 00	30411 00	30611 00	3069A 00	3069A 11	30840 12	30794 22	30794 22	30892 90	3079D 39	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 93 pt
30522 00	30412 00	30412 00	30612 00	3069A 00	3069A 12 3069A 15	30840 13	30794 23	30794 23		3079F 22	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 93 pt
30523 00	30413 00	30413 00	30613 00	3069A 00	3069A 13 3069A 14 3069A 16	30840 14	30794 24	30794 24		3079F 22	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 93 pt
30524 00	30414 00	30414 00	30614 00	3069B 00	3069B 11	30840 15	30794 25	30794 25	30892 90	3079D 39	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 93 pt
30525 00	30415 00	30415 00	30615 00	3069B 00	3069B 12 3069B 13 3069B 14 3069B 19	30840 19	30794 26	30794 26		3079F 22	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 93 pt
30526 00	30416 00	30416 00	30616 00	3069B 00	3069B 21	30840 20	30795 00	30795 00		3079F 22	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 93 pt
30534 11	32934 11	32934 11	30617 00	3069B 00	3069B 29	30841 00	30797 41	30797 41	30893 00	3079F 22	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
30534 13	32934 13	32934 13	30618 00	3069B 00	3069B 30	30842 10	30797 51	30797 42		3079F 22	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
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30534 17	32934 17	32934 17	30620 00	3069B 00	3069B 32	30842 90	30797 59	30797 42	30894 01	30798 01	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
30535 11	32935 11	32935 11	30621 00	3069B 00	3069B 33	30843 10	30797 61	30797 44		30798 02	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
30535 13	32935 13	32935 13	30622 00	3069B 00	3069B 34	30843 90	30797 69	30797 44		30798 02	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
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30535 23	32935 23	32935 23	30627 00	3069B 00	3069B 39	30844 50	30797 86	30797 46		30798 04	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
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30536 35	32936 35	32936 35	30634 00	3069B 00	3069B 46	30845 60	30797 91	30797 46		30798 05	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
30537 29	32937 29	32937 29	30635 00	3069B 00	3069B 47	30846 00	30797 93	30797 46	30894 06	30798 06	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
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30537 41	32937 41	32937 41	30637 00	3069B 00	3069B 49	30846 20	30797 97	30797 46		30798 06	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
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30538 19	32938 19	32938 19	30644 00	3069B 00	3069B 56	30846 90	30797 99	30797 46	30894 09	30798 09	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
30539 70	32939 70	32939 70	30645 00	3069B 00	3069B 57	30847 00	30797 99	30797 46		30798 09	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
30539 73	32939 73	32939 73	30646 00	3069B 00	3069B 58	30847 10	30797 99	30797 46		30798 09	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
30539 75	32939 75	32939 75	30647 00	3069B 00	3069B 59	30847 20	30797 99	30797 46	30895 01	30799 01	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
30539 77	32939 77	32939 77	30648 00	3069B 00	3069B 60	30847 30	30797 99	30797 46		30799 01	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt
30539 79	32939 79	32939 79	30649 00	3069B 00	3069B 61	30847 40	30797 99	30797 46		30799 01	3079J 61 pt 3079J 62 pt 3079J 63 pt 3079J 64 pt 3079J 65 pt 3079J 66 pt 3079K 99 pt

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1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	
33152 03— Con.	33152 03— Con.	33152 11 pt 34967 19 pt	33157 42— Con.	33157 42— Con.	33157 31 pt 33157 71 pt	33561 66— Con. 33562 78 33563 91 33569 91	33561 66— Con. 33562 78 33563 91 33569 91	33569 92— Con.	34236 21	34236 21	34233 21	
33152 05	33152 05	33152 11 pt 33152 13 pt 33152 17 pt 33152 19 pt 34967 13 pt 34967 17 pt 34967 19 pt	33157 43	33157 43	33157 31 pt 33157 61 pt 33157 71 pt	33630 00	33611 00	33611 00	34236 31	34236 31	34233 31	
					33159 44 33159 45 33159 48	33159 44 33159 45 33159 48	33640 11	33620 42	33620 42	34236 81	34236 81	34238 81
							33640 21	33691 51	33691 51	34236 99	34236 99	34233 99
33152 07	33152 07	33152 11 pt 33152 13 pt 33152 17 pt 33152 19 pt 34967 11 pt 34967 13 pt 34967 17 pt 34967 19 pt	33159 99	33159 99	33159 77 33159 98	33640 31	33692 31	33692 31	34292 12 34298 99	34292 12 34298 99	34298 98	
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						33640 51	33693 91	33693 91	34320 05 34320 07	34320 05 34320 07	34320 06	
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33152 09	33152 09	33152 11 pt 33152 13 pt 33152 17 pt 33152 19 pt 34967 11 pt 34967 13 pt 34967 17 pt 34967 19 pt	33211 23	33211 23	33211 22 pt 33211 24 pt 33211 27 pt 33211 30 pt	33650 31	33612 31	33612 31	34320 09 34320 11	34320 09 34320 11	34320 08	
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			33211 25	33211 25	33211 33 pt 33211 36 pt 33211 39 pt 33211 42 pt	33650 61	33612 61	33612 61	34320 47 34320 48	34320 47 34320 48	34320 79	
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33152 10	33152 10	33152 11 pt 33152 13 pt 33152 17 pt 33152 19 pt 34967 11 pt 34967 13 pt 34967 17 pt 34967 19 pt	33211 26	33211 26	33211 33 pt 33211 36 pt 33211 39 pt 33211 42 pt	33660 20	33620 20	33620 20	34320 67 34320 69	34320 67 34320 69	34320 65	
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			33217 31	33217 31	33217 32 pt 33217 34 pt 33217 37 pt 33217 40 pt	33660 22	33620 22	33620 22	34320 71 34320 74 34320 75	34320 71 34320 74 34320 75	34320 98	
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						33660 25	33620 25	33620 25	34320 80 34320 82	34320 80 34320 82	34320 55	
						33660 31	33620 31	33620 31				
			33217 35	33217 35	33217 43 pt 33217 46 pt 33217 49 pt 33217 52 pt	33660 41	33620 52	33620 61 pt	34320 84 34320 86	34320 84 34320 86	34320 56	
33152 14	33152 14	33152 11 pt 33152 13 pt 33152 17 pt 33152 19 pt 34967 11 pt 34967 13 pt 34967 17 pt 34967 19 pt	33217 36	33217 36	33217 43 pt 33217 46 pt 33217 49 pt 33217 52 pt	33660 51	33620 51	33620 51	34320 87	34320 87	34320 98 pt	
						33660 61	33620 61 pt	33620 61 pt	34320 90 34320 91	34320 90 34320 91	34320 40	
						33660 72	33620 72	33620 72	34320 92 34320 93	34320 92 34320 93	34320 42	
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						33392 31	33334 31	33334 31	34320 99	34320 99	34320 98 pt	
						33392 37	33334 37	33334 35 pt	34432 44	34432 44	34432 45	
33152 22	33152 22	33152 33 pt 34967 23 pt	33392 39	33334 39	33334 38 pt	33991 91 33991 98	33991 91 33991 98	33991 99	34432 46 34432 48	34432 46 34432 48	34432 47	
33152 23	33152 23	33152 23 34967 19 pt	33392 41	33334 41	33334 41	34234 11	34234 11	34232 31	34432 52 34432 54 34432 56 34432 98	34432 52 34432 54 34432 56 34432 98	34432 99	
33152 25	33152 25	33152 25 34967 21	33392 49	33334 49	33334 48 pt	34234 22	34234 22	34232 83	34432 52 34432 54 34432 56 34432 98	34432 52 34432 54 34432 56 34432 98	34432 99	
33152 30	33152 30	33152 33 pt 34967 23 pt	33392 51	33334 51	33334 35 pt 33334 38 pt 33334 45 pt 33334 48 pt	34234 33	34234 33	34232 85	34433 13	34433 13	34433 12 34433 14 34433 48 pt	
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33156 17	33156 17	33156 17	33398 01	33321 00	33321 00	34235 12	34235 12	34232 54				
33157 21	33157 21	33157 31 pt 33157 61 pt 33157 71 pt	33398 05	33323 00	33323 00	34235 21	34235 21	34232 56	34433 22	34433 22	34433 21 34433 23 34433 48 pt	
33157 22	33157 22	33157 31 pt 33157 61 pt 33157 71 pt	33398 73	33398 73	33399 85	34235 22	34235 22	34232 58	34433 32	34433 32	34433 31 34433 33 34433 48 pt	
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33157 23	33157 23	33157 31 pt 33157 61 pt 33157 71 pt	33416 99	33416 99	33416 51 33416 98	34235 33	34235 33	34232 99 pt 35531 85 pt 35532 81 pt	34433 39	34433 39	34433 48 pt	
33157 41	33157 41	33157 31 pt 33157 61 pt 33157 71 pt	33542 61	33542 61	33542 51 pt 33542 53 pt	34235 39	34235 39	34232 99 pt 35531 85 pt 35532 81 pt	34433 49	34433 49	34433 48 pt	
33157 42	33157 42	33157 31 pt 33157 61 pt	33542 63	33542 63	33542 51 pt 33542 53 pt	34236 11	34236 11	34232 99	34434 13	34434 13	34434 12 pt	
			33561 66	33561 66	33569 92				34434 15	34434 15	34434 18 pt	

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1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published
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34435 21	34435 21	34435 20	34464 10	34464 10	34460 54 pt 34460 56 pt	34913 59	3494A 47	3494A 47	34932 10	34932 10	34932 00
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34435 39	34435 39		34465 10	34465 10	34460 54 pt	34914 17	3494A 54	3494A 54	34945 12 34945 14	34945 12 34945 14	34945 98
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34443 23	34443 23		34692 20	34692 20	34692 99	34916 41	3494A 35	3494A 35	34964 55	34964 55	34964 31 pt 34964 61 pt 34964 71 pt 34964 99 pt
34447 21	34447 21	34446 47	34692 88	34692 88		34916 23	3494A 32	3494A 32	34964 55	34964 55	34964 31 pt 34964 61 pt 34964 71 pt 34964 99 pt
34447 25	34447 25	34446 46	34692 98	34692 98		34916 31	3494A 33	3494A 33	34964 55	34964 55	34964 31 pt 34964 61 pt 34964 71 pt 34964 99 pt
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34447 41	34447 41	34446 51	34699 98	34699 98		34916 65	3494A 38	3494A 38	34966 23	34966 23	34966 13
34448 11	34448 11	34446 62 pt	34790 10	34790 10	34790 19	34916 77	3494A 71	3494A 71	34966 25	34966 25	34966 25
34448 13	34448 13	34446 64 pt	34790 11	34790 11		34916 79	3494A 75	3494A 75	34966 29	34966 29	34966 27
34448 19	34448 19		34790 21	34790 21		34916 98	3494A 98	3494A 98	34966 29	34966 29	34966 27
34449 31	34449 31	34446 15	34911 11	34911 11	3494A 11	34917 11	34949 11	34949 11	34966 29	34966 29	34966 21
34449 41	34449 41	34446 62 pt 34446 64 pt	34911 21	34911 21	3494A 12	34917 13	34949 13	34949 13	34966 29	34966 29	34966 27
34449 53	34449 53	34446 44	34911 34	34911 34	3494A 14	34917 27	34949 27	34949 21	34966 29	34966 29	34966 27
34449 55	34449 55	34446 42	34911 38	34911 38	3494A 15	34917 27	34949 27	34949 23	34966 29	34966 29	34966 27
34449 62	34449 62	34446 62 pt	34911 43	34911 43	3494A 17	34917 31	34949 31	34949 31	34966 29	34966 29	34966 27
34449 65	34449 65	34446 64 pt	34911 52	34911 52	3494A 19	34917 39	34949 39	34949 39	34966 29	34966 29	34966 27
34449 98	34449 98	34446 98	34912 01	34912 01	3494A 21	34917 98	34949 98	34949 98	34966 29	34966 29	34966 27
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34461 12	34461 12	34460 09	34912 21	34912 21	3494A 23	34919 00	34948 00	34948 00	34966 29	34966 29	34966 27
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34461 17	34461 17	34460 17	34912 31	34912 31	3494A 25	34922 00	3494C 00	3494C 00	34966 29	34966 29	34966 27
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34462 26	34462 26	34460 51	34913 11	34913 11	3494A 39	34926 00	3494G 00	3494G 00	34966 29	34966 29	34966 27
34463 10	34463 10	34460 41	34913 23	34913 23	3494A 43	34927 00	3494H 00	3494H 00	34966 29	34966 29	34966 27

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1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published
35112 74	35112 74	35112 75 pt	3531E 00	3531E 00	35314 00 pt	35337 22	35337 22	35331 41	35364 03	35364 03	35362 09
35112 76	35112 76	35112 75 pt	3531F 00	3531F 00	35316 00	35337 23	35337 23		35362 15 pt		
35112 77						35337 24	35337 24	35331 46			
35112 79	35112 79	35112 00 pt	3531G 00	3531G 00	35318 00 pt	35337 25	35337 25				
35112 83	35112 83		3531H 00	3531H 00	35313 00 pt	35337 26	35337 26	35331 43			
35119 01	35119 01	35119 98 pt			35318 00 pt	35337 27	35337 27				
35119 01					35319 85	35337 44	35337 44	35331 44			
35119 33	35119 26	35119 26	3531K 06	3531K 06	35319 06	35337 45	35337 45	35331 45			
35119 41	35119 41	35119 03	3531K 07	3531K 07	35319 07	35337 47	35337 47	35331 47			
35119 42	35119 42										
35119 43	35119 43	35119 04	3531K 11	3531K 11	35319 11	35337 48	35337 48	35331 48			
35119 44	35119 44		3531K 20	3531K 20	35319 20	35337 59	35337 59	35331 59			
35119 45	35119 45	35119 05	3531K 21	3531K 21	35319 21	35337 61	35337 61	35332 61 pt			
35119 46	35119 46										
35119 47	35119 47	35119 06 pt	3531K 22	3531K 22	35319 23	35338 31	35338 31	35332 31			
		35119 07 pt	3531K 24	3531K 24		35338 51	35338 51	35332 51			
35119 48	35119 48	35119 06 pt	3531K 25	3531K 25	35319 25	35338 55	35338 55	35332 55			
		35119 07 pt				35338 98	35338 98	35332 98			
35119 51	35119 51	35119 14	3531K 27	3531K 27	35319 27	35338 99	35338 99	35332 61 pt			
35119 52	35119 52		3531K 53	3531K 53	35319 52	35338 99	35338 99				
35119 53	35119 53	35119 15	3531K 55	3531K 55							
35119 54	35119 54		3531K 61	35363 36	35361 36	35339 12	35339 12	35333 12			
35119 55	35119 55	35119 16	3531K 70	3531K 70	35319 70	35339 13	35339 13	35333 13			
35119 56	35119 56										
35119 57	35119 57	35119 17	3531K 74	3531K 74	35319 72	35339 14	35339 14	35333 14			
35119 58	35119 58				35319 73	35339 19	35339 19	35333 19			
35119 59	35119 59	35119 18	3531K 77	3531K 77	35319 75	35339 21	35339 21	35333 21			
35119 60	35119 60				35319 76	35339 21	35333 21				
35119 61	35119 61	35119 19	3531K 82	3531K 82	35319 82	35339 53	35339 53	35333 53			
35119 62	35119 62										
35119 91	35119 91	35119 22 pt	3531K 90	3531K 40	35319 41	35339 55	35339 55	35333 55			
		35119 23 pt	35373 90	35371 91	35371 93	35339 57	35339 57	35333 57			
		35119 28 pt				35339 61	35339 61	35333 61			
		35119 29 pt									
		35119 98 pt	3531K 97	3531K 97	35319 97	35339 65	35339 65	35333 65			
35119 92	35119 92	35119 22 pt	3531M 01	3531M 01	35313 00 pt	35339 65	35339 65	35333 65			
		35119 23 pt	3531M 03	3531M 03	35314 00 pt	35339 71	35339 71	35333 71			
		35119 28 pt	3531M 05	3531M 05	35319 84 pt	35339 71	35339 71	35333 71			
		35119 29 pt			35319 86 pt	35339 82	35339 82	35333 82			
		35119 98 pt				35339 98	35339 98	35333 98			
35239 26	35239 26	35239 21	3531M 07	3531M 07	35319 84 pt	35339 98	35339 98	35333 98			
		35239 25			35319 86 pt	35339 10	35339 10	35333 10			
35239 31	35239 31	35239 01	3531M 09	3531M 09	35319 84 pt	35339 10	35339 10	35333 10			
		35239 02			35319 86 pt	35339A 78	35339A 78	35333 78			
		35239 03									
		35239 04									
		35239 05	3531M 15	3531M 19	35319 84 pt	35339B 21	35339B 21	35333 21			
		35239 06			35319 86 pt	35339B 32	35339B 32	35333 31			
		35239 07			35374 15	35339B 34	35339B 34				
		35239 08									
		35239 09									
		35239 11									
		35239 12									
		35239 19									
		35239 30									
35239 53	35239 53	35239 50	35329 37	35329 37	35329 39	35339 13	35339 13	35333 13			
		35239 51	35329 38	35329 38		35363 15	35363 15	35361 14			
3523C 00	3523C 00	35234 00 pt	35329 41	35329 41		35363 16	35363 16	35361 16			
		35237 00	35329 43	35329 43							
		35238 00 pt									
3523E 00	3523E 00	35234 00 pt	35329 71	35329 71	35329 79	35363 16	35363 16	35361 16			
		35238 00 pt	35329 73	35329 73							
			35329 75	35329 75							
3523F 00	3523F 00	35234 00	35337 11	35337 11	35331 11	35363 34	35363 34	35361 35	35374 19	35374 19	35372 85 pt
		3523B 00			35331 12	35337 12	35331 12				
35246 00	35246 00	35243 00	35337 14	35337 14	35331 14	35363 37	35363 37	35361 39 pt	35421 00	35421 00	35421 10
		35245 00				35363 38	35363 38				35421 20
3531A 00	3531A 00	35311 00	35337 15	35337 15	35331 15	35363 45	35363 45	35361 45	35424 01	35424 01	35424 11
									35424 02		
3531B 00	3531B 00	35312 00	35337 16	35337 16	35331 16	35364 01	35364 01	35362 07	35424 03	35424 03	35424 75
								35362 15 pt	35424 04		
3531C 00	3531C 00	35317 10	35337 17	35337 17	35331 17	35364 02	35364 02	35362 08	35424 05	35424 05	
		35317 20						35362 15 pt			
		35317 30							35430 11	35650 11	35650 11

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35430 98	35650 98	35650 98	35462 72	35462 72	35462 73 35462 74 35462 75 35462 76 35462 77 35462 78	35484 09	35496 19	35496 19	35543 03	35543 03	35541 28 pt 35542 73 pt
35441 23	35441 23	35441 29				35485 01	35497 61	35497 61	35543 04	35543 04	35541 25 35542 73 pt
35441 25	35441 25					35485 02	35497 65	35497 65			
35441 42	35441 42	35441 91				35485 03	35497 67	35497 67	35543 05	35543 05	35541 28 pt 35542 73 pt
35441 44	35441 44					35485 04	35497 73	35497 73	35543 09	35543 09	35541 31 35542 73 pt
35441 83	35441 83					35485 05	35497 74	35497 63 35497 75	35543 11	35543 11	35541 49 pt 35542 73 pt
35441 89	35441 89					35485 07	35495 55	35495 55			
35442 15	35442 15	35442 21 35442 25 pt				35485 09	35497 81	35497 81	35543 12	35543 12	35541 49 pt 35542 73 pt
35442 16	35442 16	35442 25 pt				35492 13	35492 13	35492 19	35543 13	35543 13	35541 45 35542 73 pt
35442 17	35442 17	35442 62 pt				35492 18	35492 18				
35442 18	35442 18					35495 01	35495 01	35495 10	35543 14	35543 14	35541 49 pt 35542 73 pt
35442 19	35442 19					35495 02	35495 02				
35442 23	35442 23					35495 03	35495 03				
35442 41	35442 41	35442 33				35495 92	35495 92	35495 98	35543 15	35543 15	35541 41 35541 43 35541 49 pt 35542 73 pt
35442 42	35442 42					35495 95	35495 95				
35442 45	35442 45	35442 62 pt				35521 38	35521 38	35521 42 35521 47	35543 21	35543 21	35541 59 pt 35542 73 pt
35442 47	35442 47					35521 39	35521 39	35521 46 35521 48	35543 22	35543 22	35541 51 35542 73 pt
35442 67	35442 67					35521 54	35521 54	35521 55	35543 23	35543 23	35541 53 35542 73 pt
35451 53	35451 53	35451 43 35451 44				35521 56	35521 56		35543 24	35543 24	35541 54 pt 35541 59 pt 35542 73 pt
35451 54	35451 54	35451 48 35451 49				35521 68	35521 68	35521 67			
						35521 69	35521 69				
35454 12	35454 12	35453 12				35521 84	35521 84	35521 86	35543 25	35543 25	35541 54 pt 35541 59 pt 35542 73 pt
35454 14	35454 14	35453 14				35521 85	35521 85				
35454 17	35454 17	35453 17				35522 79	35522 79	35522 72 35522 99			
35454 31	35454 31	35453 31				35533 11	35533 11	35531 11	35543 26	35543 26	35541 56 35541 59 pt 35542 73 pt
35454 37	35454 37	35453 37				35533 13	35533 13	35531 13			
35454 38	35454 38	35453 38				35533 15	35533 15	35531 15	35544 01	35544 01	35542 89
35454 41	35454 41	35453 41				35533 19	35533 19	35531 62	35544 02	35544 02	35542 83
35454 43	35454 43	35453 43				35533 21	35533 21	35531 73 pt	35544 03	35544 03	35542 85
35454 45	35454 45	35453 45				35533 23	35533 23		35544 04	35544 04	
35454 51	35454 51	35453 51				35533 25	35533 25	35531 75 pt	35544 05	35544 05	35542 87
35454 59	35454 59	35453 59				35533 27	35533 27				
35454 98	35454 98	35453 98				35533 29	35533 29	35531 98 pt	35551 02	35551 02	35551 01 35551 03 35551 05 35551 08
35455 11	35455 11	35452 11				35533 31	35533 31	35531 73 pt			
35455 13	35455 13	35452 13				35533 33	35533 33	35531 75 pt	35553 05	35553 05	35553 01 35553 02 35553 04
35455 15	35455 15	35452 15				35533 35	35533 35	35531 98 pt	35553 08	35553 08	35553 11 35553 12
35455 17	35455 17	35452 17				35533 37	35533 37				
35455 21	35455 21	35452 21				35533 39	35533 39	35531 17 35531 73 pt 35531 75 pt 35531 98 pt	35553 09	35553 09	35553 45 35553 52 35553 57
35455 61	35455 61	35452 61				35533 87	35533 87	35531 87	35558 02	35558 02	35557 01
35455 65	35455 65	35452 65				35534 01	35534 01	35532 21	35558 09	35558 09	
35455 71	35455 71	35452 71				35534 02	35534 02				
35455 81	35455 81	35452 99 pt 35455 83				35534 03	35534 03				
35455 91	35455 91	35452 92				35534 04	35534 04	35532 98	35558 83	35558 83	35557 83
35455 92	35455 92					35534 05	35534 05				
35455 93	35455 93	35452 99 pt				35534 06	35534 06				
35455 94	35455 94	35452 94				35534 07	35534 07		35558 87	35558 87	35557 87
35455 95	35455 95	35452 95				35534 08	35534 08		35558 89	35558 89	35557 89
35455 96	35455 96	35452 99 pt				35534 09	35534 09				
35455 97	35455 97					35534 11	35534 11	35532 81 pt	35558 99	35558 99	35557 99
35455 98	35455 98					35543 01	35543 01	35541 11 35542 73 pt			
35462 42	35462 42	35462 43				35543 02	35543 02	35541 21 35541 27 35542 73 pt	35561 02	35511 02	35511 41 pt 35511 99 pt
35462 44	35462 44					35548 05	35496 17	35496 17	35561 05	35511 05	35511 73
35462 47	35462 47	35462 45 35462 49				35548 09	35496 17		35561 06	35511 06	35511 83

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35561 07	35511 07	35511 91	35593 01	35593 11	35593 11	35599 13	35599 13	35595 41 pt 35595 98 pt	35616 00	35616 00	3561C 00
35561 08	35511 08	35511 99 pt	35593 03	35593 31	35593 31	35599 15	35599 15	35595 41 pt 35595 98 pt	35645 46 35645 47	35645 46 35645 47	35645 49
35561 09	35511 09	35511 41 pt	35593 05	35593 32	35593 32	35599 17	35599 17	35595 41 pt 35595 98 pt	35646 10 35646 20	35646 10 35646 20	35646 00
35561 11	35511 11	35511 99 pt	35593 07	35593 34	35593 34	35599 19	35599 19	35595 41 pt 35595 98 pt	35651 01	35514 15 35691 15	35514 15 35691 15
35561 19	35511 19		35593 09	35593 35	35593 35	35599 22	35599 22	35595 41 pt 35595 98 pt	35651 02	35514 22 35691 22	35514 22 35691 22
35561 21	35511 21		35593 11	35593 52	35593 52	35599 25	35599 25	35595 41 pt 35595 98 pt	35651 03	35514 26 35691 26	35514 26 35691 26
35562 11	35512 11	35512 11	35593 13	35593 13	35593 53 35593 54	35599 27	35599 27	35595 41 pt	35651 04	35514 29 35691 29	35514 29 35691 29
35562 21	35512 21	35512 21	35593 15	35593 61	35593 61	35599 29	35599 29	35595 41 pt	35651 05	35514 30 35691 30	35514 30 35691 30
35562 31	35512 31	35512 31	35593 17	35593 71	35593 71	35599 31	35599 31	35595 45	35651 06	35514 32 35691 32	35514 32 35691 32
35562 41	35512 41	35512 41	35593 19	35593 72	35593 72	35599 33	35599 33	35595 45	35651 07	35514 33 35691 33	35514 33 35691 33
35562 51	35512 51	35512 51	35593 21	35593 21	35593 79	35599 39	35599 39	35595 43	35651 08	35514 35 35691 35	35514 35 35691 35
35562 65	35512 65	35512 61 35512 92 pt	35593 23	35593 23	35593 23	35599 43	35599 43	35595 52	35651 09	35514 41 35691 41	35514 41 35691 41
35562 71	35512 71	35512 71	35593 25	35593 25	35593 25	35599 47	35599 47	35595 85 pt	35651 11	35514 52 35691 52	35514 52 35691 52
35562 75	35512 75	35512 75	35593 27	35593 27	35593 81	35599 49	35599 49	35595 98 pt	35651 12	35514 53 35691 53	35514 53 35691 53
35562 85	35512 85	35512 92 pt	35593 28	35593 28	35593 29	35599 51	35599 51	35595 98 pt	35651 13	35514 54 35691 54	35514 54 35691 54
35562 91	35512 91	35512 87 35512 92 pt	35594 01	35594 11	35594 11	35599 53	35599 53	35595 73	35651 14	35514 55 35691 55	35514 55 35691 55
35563 01	35513 01	35513 59 pt	35594 03	35594 31	35594 31	35599 57	35599 57	35595 92	35651 15	35514 63 35691 63	35514 63 35691 63
35563 02	35513 02	35513 39	35594 05	35594 51	35594 51	35599 67	35599 67	35595 86 pt	35651 16	35514 71 35691 71	35514 71 35691 71
35563 03	35513 03	35513 59 pt	35594 07	35594 71	35594 71	35599 69	35599 69	35595 83 pt 35595 84 pt	35651 17	35514 81 35691 81	35514 81 35691 81
35563 04	35513 04		35594 09	35594 09	35594 79	35599 71	35599 71	35595 82 pt 35595 83 pt 35595 84 pt 35595 85 pt 35595 86 pt	35651 18	35514 82 35691 82	35514 82 35691 82
35563 05	35513 05	35513 23 pt 35513 59 pt	35594 13	35594 13	35594 15	35599 73	35599 73	35595 87	35651 19	35514 83 35691 83	35514 83 35691 83
35563 06	35513 06	35513 52 35513 59 pt	35594 17	35594 17	35594 81	35599 75	35599 75	35595 87	35651 21	35514 84 35691 84	35514 84 35691 84 pt
35563 07	35513 07	35513 59 pt	35594 19	35594 19	35594 21	35599 77	35599 77	35595 94	35651 22	35514 11 35691 85	35513 67 35691 84 pt
35563 08	35513 08	35513 49	35594 21	35594 21	35594 21	35599 80	35599 80	35595 98 pt	35652 00	35514 91 35691 91	35513 83 pt 35514 91 35691 91
35563 09	35513 09	35513 59 pt	35594 23	35594 23	35594 23	35599 82	35599 82	35595 62 pt	35667 01	35674 01	35674 11 pt
35563 11	35513 11	35513 13	35594 25	35594 25	35594 25	35599 83	35599 83	35595 98 pt	35667 02	35674 02	35674 17
35563 12	35513 12	35513 23 pt 35513 59 pt	35594 27	35594 27	35594 27	35599 85	35599 85	35595 62 pt 35595 98 pt	35667 03	35674 03	35674 19 pt 35674 31 pt
35563 14	35513 14	35513 59 pt	35594 29	35594 29	35594 31	35599 86	35599 86	35595 98 pt	35667 04	35674 04	35674 11 pt 35674 19 pt 35674 31 pt
35563 15	35513 15	35513 29 35513 59 pt	35594 31	35594 31	35594 33	35599 88	36362 74	36362 74	35667 05	35674 05	35674 19 pt 35674 31 pt
35563 21	35513 21	35513 83 pt	35594 35	35594 35	35594 37	35599 89	36362 75	36362 75	35667 06	35674 06	35674 19 pt 35674 31 pt
35591 01	35591 01	35591 00 pt	35594 37	35594 37	35594 39	35599 90	36362 85	36362 85	35667 07	35674 07	35674 19 pt 35674 31 pt
35591 03	35591 03		35594 41	35594 41	35594 43	35599 92	35599 92	35595 98 pt	35667 08	35674 08	35674 19 pt 35674 31 pt
35591 05	35591 05		35594 43	35594 43	35594 45	35599 93	35599 93		35667 09	35674 09	35674 19 pt 35674 31 pt
35591 07	35591 07	35591 00 pt 35698 33	35594 45	35594 45	35594 47	35599 94	35599 94		35667 10	35674 10	35674 19 pt 35674 31 pt
35591 09	35591 09	35591 00 pt	35594 47	35594 47	35594 49	35599 95	35599 95		35667 11	35674 11	35674 19 pt 35674 31 pt
35591 11	35591 11		35594 49	35594 49	35594 51	35599 96	35599 96		35667 12	35674 12	35674 19 pt 35674 31 pt
35591 13	35591 13	35591 00 pt 35698 34	35594 51	35594 51	35594 53	35599 97	35599 97		35667 13	35674 13	35674 19 pt 35674 31 pt
35591 15	35591 15	35591 00 pt	35594 53	35594 53	35594 55	35599 98	35599 98		35667 14	35674 14	35674 19 pt 35674 31 pt
35592 01	35592 21	35592 21	35594 55	35594 55	35594 57	35599 99	35599 99		35667 15	35674 15	35674 19 pt 35674 31 pt
35592 03	35592 33	35592 33	35594 57	35594 57	35594 59	35599 99	35599 99		35667 16	35674 16	35674 19 pt 35674 31 pt
35592 05	35592 35	35592 35	35594 59	35594 59	35594 61	35599 99	35599 99		35667 17	35674 17	35674 19 pt 35674 31 pt
35592 07	35592 54	35592 54	35594 61	35594 61	35594 63	35599 99	35599 99		35667 18	35674 18	35674 19 pt 35674 31 pt
35592 09	35592 09	35592 98 pt	35594 63	35594 63	35594 65	35599 99	35599 99		35667 19	35674 19	35674 19 pt 35674 31 pt
35592 11	35592 11		35594 65	35594 65	35594 67	35599 99	35599 99		35667 20	35674 20	35674 19 pt 35674 31 pt
35592 15	35592 15	35592 41 35592 42 35592 98 pt	35594 67	35594 67	35594 69	35599 99	35599 99		35667 21	35674 21	35674 19 pt 35674 31 pt
35592 19	35592 97	35592 97	35594 69	35594 69	35594 71	35599 99	35599 99		35667 22	35674 22	35674 19 pt 35674 31 pt
			35594 71	35594 71	35594 73	35599 99	35599 99		35667 23	35674 23	35674 19 pt 35674 31 pt
			35594 73	35594 73	35594 75	35599 99	35599 99		35667 24	35674 24	35674 19 pt 35674 31 pt
			35594 75	35594 75	35594 77	35599 99	35599 99		35667 25	35674 25	35674 19 pt 35674 31 pt
			35594 77	35594 77	35594 79	35599 99	35599 99		35667 26	35674 26	35674 19 pt 35674 31 pt
			35594 79	35594 79	35594 81	35599 99	35599 99		35667 27	35674 27	35674 19 pt 35674 31 pt
			35594 81	35594 81	35594 83	35599 99	35599 99		35667 28	35674 28	35674 19 pt 35674 31 pt
			35594 83	35594 83	35594 85	35599 99	35599 99		35667 29	35674 29	35674 19 pt 35674 31 pt
			35594 85	35594 85	35594 87	35599 99	35599 99		35667 30	35674 30	35674 19 pt 35674 31 pt
			35594 87	35594 87	35594 89	35599 99	35599 99		35667 31	35674 31	35674 19 pt 35674 31 pt
			35594 89	35594 89	35594 91	35599 99	35599 99		35667 32	35674 32	35674 19 pt 35674 31 pt
			35594 91	35594 91	35594 93	35599 99	35599 99		35667 33	35674 33	35674 19 pt 35674 31 pt
			35594 93	35594 93	35594 95	35599 99	35599 99		35667 34	35674 34	35674 19 pt 35674 31 pt
			35594 95	35594 95	35594 97	35599 99	35599 99		35667 35	35674 35	35674 19 pt 35674 31 pt
			35594 97	35594 97	35594 99	35599 99	35599 99		35667 36	35674 36	35674 19 pt 35674 31 pt
			35594 99	35594 99	35594 99	35599 99	35599 99		35667 37	35674 37	35674 19 pt 35674 31 pt
			35594 99	35594 99	35594 99	35599 99	35599 99		35667 38	35674 38	35674 19 pt 35674 31 pt
			35594 99	35594 99	35594 99	35599 99	35599 99		35667 39	35674 39	35674 19 pt 35674 31 pt
			35594 99	35594 99	35594 99	35599 99	35599 99		35667 40	35674 40	35674 19 pt 35674 31 pt
			35594 99	35594 99	35594 99	35599 99	35599 99		35667 41	35674 41	35674 19 pt 35674 31 pt
			35594 99	35594 99	35594 99	35599 99	35599 99		35667 42	35674 42	35674 19 pt 35674 31 pt
			35594 99	35594 99	35594 99	35599 99	35599 99		35667 43	35674 43	35674 19 pt 35674 31 pt
			35594 99	35594 99	35594 99	35599 99	35599 99		35667 44	35674 44	35674 19 pt 35674 31 pt
			35594 99	35594 99	35594 99	35599 9					

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35676 03	35676 03	35672 61	35752 00	35733 40	35734 30 pt 35735 51 pt	35892 99	35892 99	35892 93 pt	35963 05	35763 05	35760 63
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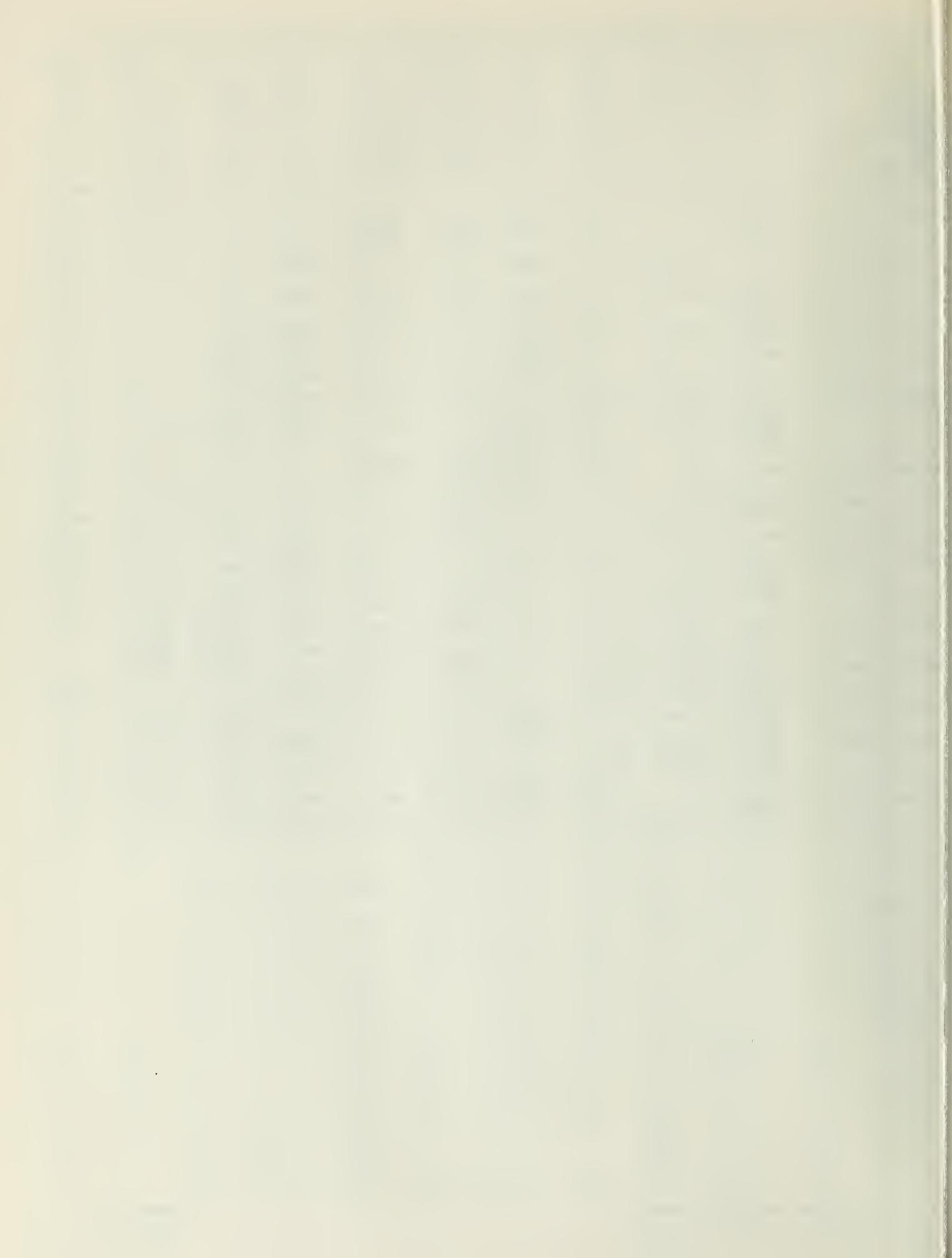
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1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published
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			37431 18	37431 18		37999 06	37999 06	37998 53	38423 22	38423 22	
						37999 19	37999 19	37998 35 37998 51 37998 82	38423 23	38423 23	
								37998 84	38423 24	38423 24	
								37998 86			
								37998 90			
						37433 01	37433 41	37433 41	38423 21	38423 21	
						37433 02	37433 61	37433 61	38423 22	38423 22	
						37999 21	37999 21	37998 88	38423 23	38423 23	
									38423 24	38423 24	
										38517 04	38517 04
										38517 05	38517 09

[Based on revisions to the Standard Industrial Classification (SIC) Manual, definitions of some product codes were revised for 1987. Listed below are the revisions to the product codes. The terms published and collected are defined as follows: (1) published refers to the code used in the published reports for 1987 and 1982, and (2) collected refers to the code appearing on the report forms for 1987.]

1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published	1987 published	1987 collected	1982 published
38517 04— Con.	38517 04— Con.	38517 09— Con.	38731 06	38731 06	38737 01	39153 11	39153 11	39151 13 pt
38517 06	38517 06		38731 07	38731 07	38737 02 38737 03	39153 12	39153 12	39151 31 pt
38517 07	38517 07					39153 21	39153 21	39151 41
38517 10	38517 10					39153 31	39153 31	39151 51 pt
38517 11	38517 11		38731 11	38731 11	38737 19			
38611 11	38611 11	38611 12 38611 14	38731 13	38731 13	38736 39	39154 00	39154 11	39151 13 pt 39151 31 pt 39151 51 pt
38611 69	38611 69	38611 67 38611 68	38732 01	38732 01	38732 10 38732 22	39314 24 39314 25	39314 24 39314 25	39314 23
38611 91	38611 91	38611 81	38732 02	38732 02	38732 14 38732 24	39443 46	39443 46	39443 44 39443 45
38611 98	38611 98	38611 43 38611 99	38732 03	38732 03	38732 16 38732 26	39443 47 39443 98	39443 47 39443 98	39443 99
38613 17	38613 17	38613 27 38613 46	38732 09	38732 09	38732 18 38732 20 38732 29 38732 30	39447 16	36629 46	36629 00 pt
38613 89	38613 89	38613 98				39493 01	39493 01	39494 62
38613 97	38613 97	38613 61	39113 11	39113 11	39112 11 pt	39493 02	39493 02	39494 63
38615 01	38615 01	38615 11 38615 17 38615 32 38615 37	39113 21	39113 21	39112 21 pt	39495 05	39495 05	39495 99 pt
			39113 31	39113 31	39112 31 pt	39495 72	39495 72	39495 78 39495 79
38615 02	38615 02	38615 63	39113 41	39113 41	39112 41 pt	39495 81 39495 88 39495 89	39495 81 39495 88 39495 89	39495 99 pt
			39113 98	39113 98	39112 98 pt			
38615 03	38615 03	38615 73 38615 74	39114 11	39114 11	39112 11 pt	39495 92	39495 92	39495 90 pt
38615 04	38615 04	38615 75	39114 21	39114 21	39112 21 pt	39495 93	39495 93	39495 91 pt
38615 05	38615 05	38615 57 38615 64 38615 65 38615 76 38615 81	39114 31	39114 31	39112 31 pt	39495 96	39495 96	39495 90 pt 39495 91 pt
			39114 41	39114 41	39112 41 pt	39495 98	39495 98	39495 99 pt
38619 00	38619 00	38619 41 38619 43 38619 45	39114 51 39114 61 39114 71	39114 51 39114 61 39114 71	39112 98	39496 01	39496 01	39494 65
38731 01	38731 01	38734 11 38734 12 38736 11	39141 41 39141 43 39141 69	39141 41 39141 43 39141 69	39141 66	39496 02	39496 02	39494 68
						39496 03 39496 04	39496 03 39496 04	39494 70
38731 02	38731 02	38734 22 pt 38736 13 pt	39142 35	39142 35	39142 34 39142 36	39496 05	39496 05	39494 69
38731 03	38731 03	38734 21 38734 22 pt 38736 12 38736 13 pt	39142 41 39142 43	39142 41 39142 43	39142 61	39523 00	39523 00	39521 00 39522 15
38731 05	38731 05	38736 31 38736 32 38736 33	39142 55	39142 55	39142 54 39142 56	39524 13	39524 13	39522 13
			39142 69	39142 69	39142 61 pt	39524 19	39524 19	39522 19
						39610 65	39610 65	39610 72



# PUBLICATION PROGRAM

## 1987 CENSUS OF MANUFACTURES

Publications of the 1987 Census of Manufactures, containing preliminary and final data on manufacturing establishments in the United States, are described below. Publications order forms for the specific reports may be obtained from any Department of Commerce district office or from Data User Services Division, Customer Services (Publications), Bureau of the Census, Washington, DC 20233.

### Preliminary Reports

#### Industry series—83 reports (MC87-I-20A(P) to -39D(P))

Preliminary industry data are issued in 83 separate reports covering 459 industries. Preliminary summary data for the U.S. and States are released in one report.

### Final Reports

#### Industry series—83 reports (MC87-1-20A to -39D)

Each of the 83 reports provides information for a group of related industries ("dairy products" includes industries for butter, cheese, milk, etc.). Final figures for the United States are shown for each of the 459 manufacturing industries on quantity and value of products shipped and materials consumed, cost of fuels and electric energy, capital expenditures, assets, rents, inventories, employment, payroll, payroll supplements, hours worked, value added by manufacture, number of establishments, and number of companies. Comparative statistics for earlier years are provided where available.

For each industry, data on value of shipments, value added by manufacture, capital expenditures, employment, and payroll are shown by employment-size class of establishment, State, and degree of primary product specialization.

#### Geographic area series—51 reports (MC87-A-1 to -51)

A separate report is being published for each State and the District of Columbia. Each report presents data for industry groups and industries on value of shipments, cost of materials, value added by manufacture, employment, payroll, hours worked, new capital expenditures, and number of manufacturing establishments for the State, MSA's, counties, and selected places. Comparative statistics for earlier census years are shown for the State and large MSA's. Manufacturing totals are presented for each county and for places with significant manufacturing activity. Detailed statistics (including inventories, assets, rents, and energy costs) are presented only in statewide totals.

#### Subject series—7 reports (MC87-S-1 to -7)

Each of the seven reports contains detailed statistics for an individual subject, such as concentration ratios in manufacturing, type of organization, water use in manufacturing, textile machinery in place, distribution of sales by class of customer, manufacturers' shipments to the Federal Government, and a general national-level summary.

#### Reference series—1 report (MC87-R-1)

The Numerical List of Manufactured and Mineral Products includes a description of the principal products and services published in the 1987 Censuses of Manufactures and Mineral Industries.

#### Location of Manufacturing Plants—1 report (MC87-LM)

This report includes data for number of establishments by four-digit SIC industry and by employment-size class for counties, incorporated places of 2,500 inhabitants or more, and zip codes for each State. (This report is available only on magnetic tape and CD-ROM.)

#### Analytical Reports—3 reports (AR87-1 to -3)

#### Exports From Manufacturing Establishments (AR87-1)

This report presents data on exports by two- and three-digit SIC industry groups for the United States and States. Information is presented on value of direct report shipments and estimates of the employment required to manufacture these products. Included are estimates of employment in manufacturing and nonmanufacturing establishments that supply parts, materials, and services for production of manufactured exports.

#### Selected Characteristics of Manufacturing Establishments That Export (AR87-2)

This report presents data on the number of manufacturing companies and establishments that export by major group, State, employment size, and ratios of exports to shipments.

#### Indexes of Production (AR87-3)

The indexes presented in this report are designed to measure the change in physical output of each manufacturing and mineral industry between 1982 and 1987.

### MICROFICHE

Every final published report in the 1987 Census of Manufactures will be available on microfiche.

### PUBLIC-USE COMPUTER TAPES AND COMPACT DISCS

Data from the final industry series, geographic area series, and the Location of Manufacturing Plants report will be available on public-use computer tapes and compact discs-read only memory (CD-ROM). These tapes will provide the same information found in the final reports. Computerized data products are available for users who wish to summarize, rearrange, or process large amounts of data. These products, with corresponding technical documentation, are sold by Data User Services Division, Customer Services (Tapes), Bureau of the Census, Washington, DC 20233.

### OTHER ECONOMIC CENSUSES REPORTS

Data on retail trade, wholesale trade, service industries, construction industries, mineral industries, transportation, enterprise statistics, minority-owned businesses, and women-owned businesses also are available from the 1987 Economic Censuses. A separate series of reports covers the censuses of outlying areas—Puerto Rico, Virgin Islands of the United States, Guam, and the Northern Mariana Islands. Separate announcements describing these reports are available free of charge from Data User Services Division, Customer Services (Publications), Bureau of the Census, Washington, DC 20233.











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